

FLIGHT

The
AIRCRAFT ENGINEER
AND AIRSHIPS

*First AERONAUTICAL
WEEKLY IN THE
WORLD*

Founded in 1909 by Stanley Spooner

DEVOTED TO THE INTERESTS,
PRACTICE AND PROGRESS
OF AVIATION

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

No. 1353. Vol. XXVI. 26th Year.

NOVEMBER 29, 1934

Thursdays, Price 6d.
By Post, 7½d.

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1
Telegrams: Truditur, Watloo, London. Telephone: Hop 3333 (50 lines).

HERTFORD ST., COVENTRY.

Telegrams: Autocar, Coventry.
Telephone: Coventry 5210.

GUILDHALL BUILDINGS,
NAVIGATION ST., BIRMINGHAM, 2.
Telegrams: Autopress, Birmingham.
Telephone: Midland 2971.

260, DEANS GATE, MANCHESTER, 3.

Telegrams: Iliffe, Manchester.
Telephone: Blackfriars 4412.

26B, RENFIELD ST.,
GLASGOW, C.2.

Telegrams: Iliffe, Glasgow
Telephone: Central 4857.

SUBSCRIPTION RATES: Home and Canada: Year, £1 13 0. 6 months, 16s. 6d. 3 months, 8s. 3d.
Other Countries: Year, £1 15 0. 6 months, 17s. 6d. 3 months, 8s. 9d.

A Masterly Summary

LORD LONDONDERRY, Secretary of State for Air, has rarely in his long career made a more convincing speech than the one he delivered in the House of Lords on November 21. Lord Moyne had raised the question of the speed of British air transport, in connection with the exploits of the great race to Australia. This gave the Air Minister a chance to sum things up and put the present position in proper perspective. He seized the chance with both hands, as the saying is, and his summary can only be described as masterly.

What will probably come as the greatest surprise to the more headlong critics of British progress are the figures quoted by Lord Londonderry of the costs of the air mail to the American taxpayer. In 1933 the net loss to the United States Post Office (in other words, the direct subsidy) was in the neighbourhood of £4,750,000, and the total expenditure of the U.S. Government on the development of civil flying in the seven years from 1927 to 1933 inclusive reached the "staggering total" of £25,000,000. It is no wonder that with such floods of money at their disposal the American airways could put up some very fine performances. The public of the British Empire would consider no possible speed of air communications as a justification for such expenditure. The U.S. Government itself has come to the conclusion that this state of affairs cannot go on. As the immediate result of the Government reducing air mail contract rates, some leading representatives of the air transport industry have frankly admitted that they are on the verge of ruin. A business which needs 4½ million pounds of public money a year to keep it out of the bankruptcy court is not what we British understand as a healthy concern. There will be no great popular demand for our Government departments to follow the American example.

As for the Douglas machine, which has been made

the text for the sermons of those who would belabour our Government, Lord Londonderry explained that our present aim was to achieve a paying load of 3½ to 5 tons "under conditions in which the Douglas would give less than half that load." Certainly our ambitions, as compared with the achievements in America, cannot be described as unduly modest.

Speeding Up

TO be fair to Imperial Airways has always been an endeavour of *Flight*; we recognise that they have been given a mandate to become self-supporting by the time that the subsidy contracts should cease. We have never doubted their ability to increase their journey speed, while we have always admitted that such an increase as would jeopardise the fulfilment of the mandate would be improper. Speed costs money, and an increase of speed above a certain point must imply a new subsidy. Lord Londonderry is prepared to ask the Treasury for more subsidy money for Imperial Airways. In the meantime that company, in addition to speeding up its schedules above the contract rates as improved aircraft became available, has just announced a doubling of the services between London and Calcutta and London and Johannesburg, without demanding any new subsidy. Evidently the growth of traffic on those routes justifies the new move, and that is a very healthy state of affairs. Though the journey times between the cities mentioned may not be expedited, the duplication of the services certainly has the effect of speeding up the mails. A person whose letter has just missed one mail aeroplane has hitherto had to wait a week before the letter could be despatched. He could justly include that week in the journey time of the letter. Now he will only have to include three or four days of waiting in the total journey.

The new subsidy of which Lord Londonderry spoke is to be used for reducing the journey time to South-

East Australia to about $7\frac{1}{4}$ days. That is such a great advance that for the present everyone ought to be satisfied, and captious critics should be hushed. The very excellent K.L.M. do not maintain that they could do much better than that, and just now the K.L.M. seem to have become the criterion by which our Eastern service is to be judged. We are proposing also to carry greater payloads than the aeroplanes used by the K.L.M. can carry. If that programme can be put into effect, and there is no reason why it should not be fulfilled, we shall have no reason to sing small.

We do not regard this programme as the ultimate ideal. Probably there is no such thing as an ultimate ideal in air transport, for no one knows what technical improvements the future has in store for us. Taking present knowledge, however, a full development of night flying ought to cut down the $7\frac{1}{4}$ -day schedule very substantially.

Spot-welding Duralumin

IN his article on metal construction as exemplified by the exhibits at the Paris Salon, published in our *Aircraft Engineer* Supplement this week, Mr. Marcus Langley draws attention to a spot-welding process which has been applied, apparently successfully, to

joining two pieces of Duralumin sheet. Spot-welding of steel, and its variant, known as "shot-welding," have, of course, been used extensively for aircraft work, but so far it has not been found possible to utilise these processes for joining light alloy sheets. Mr. Langley is able to quote in his article certain figures of strength attained in the works of one of the French aircraft constructors, and not merely in a laboratory, and from these it would appear that the process is promising.

As Mr. Langley says, it is very much to be hoped that no unforeseen difficulties will arise when the process is faced with the acid test of practical usage. Its possibilities appear to be almost unlimited. The tendency is more and more towards metal-clad and metal *monocoque* construction, and ordinary riveting is a somewhat laborious, although mechanically very satisfactory, method of joining metal parts together. If the new spot-welding process survives the very searching tests which will be made during the next few months, it may well be found to accelerate very materially the general adoption of metal skin construction, not only for hulls and fuselages, but also for wings. Until large sizes are reached there is a good deal to be said for the use of light alloys in flying-boat hulls, and the cost of building them would be materially reduced if a welding process could be used with an assurance of reliability.



ANCIENT HISTORY: An aerial view of Old Sarum, once the site of a populous cathedral city with a Norman castle. It was deserted many centuries ago in favour of the modern Salisbury. Nearby lies Old Sarum aerodrome, home of the R.A.F. School of Army Co-operation and of No. 16 (A.C.) Squadron. An article on the School appears on pages 1277-1280. (*Flight* Photo.)

The Outlook

A Running Commentary on Air Topics

Buying Foreign Aircraft

SOME surprise appears to have been caused in certain quarters by the recent announcement that the British Air Ministry has purchased an American day bomber—a Northrop—and the impression seems to have been gained that the purchase is in some way a reflection on our British aircraft designers and constructors. This is, of course, far from being the case. For a good many years it has been the custom of all aircraft manufacturing nations occasionally to purchase types of aircraft from one another. It is natural that in the normal course of progress one nation may at any one moment have concentrated on the development of a particular type of machine for which there has not previously been any need or demand in another nation. The type may incorporate certain features which make it attractive, possibly even for a purpose different from that for which it was originally designed.

In the circumstances it is obviously the quickest and cheapest way to purchase a specimen and to try it out thoroughly. Great Britain has in the past bought French, Dutch, and American machines, and no particular significance need be attached to the recent acquisition of the Northrop. The United States have from time to time purchased aircraft from us. So have other great aircraft manufacturing nations, such as France.

The "Pusher" Again

AT regular intervals since the appearance of the genuine private owner's machine, the "pusher" arrangement has been suggested, either on paper or in fact, as the ideal one for small civil craft.

The advantages in the matter of field of vision, comfort, and convenience do not need to be stressed again, and it is significant that the design selected by the U.S. Department of Commerce, after bids had been invited for suitable machines for use by their inspectors, is a "pusher" monoplane of comparatively low power.

Pilots have become accustomed to the more normal layout, and think, perhaps, rather too often of the "rear-engined" dangers in a mild crash. Actually, in the days when the "pusher" was more common, engines very rarely fell on the surprised occupants. Furthermore, the winning design, the Hammond Model Y, carries a fully castoring wheel ahead of the normal undercarriage, so a "nose-over" as a result of a bad landing or of fast taxiing into heavy ground would be an unlikely event.

Ground Control

ONE development of the modern machine may eventually force the "pusher" to the fore. At present wheel brakes are used primarily for manoeuvring purposes, and the pilot of the light machine uses his brake lever gingerly, fearful that his tail will lift and his propeller be damaged. A third wheel would allow the pilot to treat his machine, when once on the ground, rather as he treats his car.

Whether the single wheel should be steerable or otherwise is not of great importance, but some of the best of differentially controlled wheel brakes are extremely sensitive to rudder movement at low speeds, and the pilot sometimes has a great deal of difficulty in placing his machine accurately.

Although we have passed the time when one "blew" a machine round with full rudder and judicious bursts of

throttle—or signalled to the ground staff—perfection in driving control has not yet been reached. The best of pilots finds that his craft is an unwieldy and sometimes uncontrollable affair on solid earth.

A Diesel-engined Flying Boat

A WELCOME announcement gives hope of the fairly imminent appearance of British-built diesel engines in a British flying boat. Three of the Napier "Culverin" compression-ignition engines are about to be put into one of the Blackburn "Iris" flying boats, and the results will be watched with unusual interest. The flying boat is particularly suitable for trying out the diesel type of engine in that it is designed for long-range work, and the full advantage of the low specific fuel consumption of the diesel does not arise until durations of seven hours or more are wanted. Figures are not yet available, but a flying boat fitted with diesel engines should be able to make non-stop flights from England to Gibraltar. The strategic advantages of this are obvious.

Teaching Army Co-operation

ON another page we publish a special article on the R.A.F. School of Army Co-operation at old Sarum.

Probably it is not generally realised what an extremely exacting, though interesting, part of R.A.F. work army co-operation has become, and how very necessary it is to have a really good school to teach pilots the finer points of this work. As a mere matter of routine the Army Co-operation pilot has to carry a great deal of procedure in his head, for once he is in the air there is no means of reference, and if procedure is not followed in detail failures may occur. Though he would be quite incapable of commanding a platoon, he must, in effect, transform himself into an Army officer of at least Field rank.

To teach all this in a course of twelve weeks makes great demands on the Commanding Officer and instructors at the School. It is no wonder that they call to their aid all possible devices, such as pictorial miniature targets, slides illustrating military formations as seen from the air, "talkie" films, and so forth. The School has to train officers for ten A.C. squadrons at present, which seems a very small number when it is remembered that they are scattered over Great Britain, Egypt, and India. Some time or other the Army will have to be increased, as the Air Force is now being increased, and then there will surely be a demand for more Army Co-operation squadrons. The School at Old Sarum will have to grow in conformity.

TO THE EAST

FOLLOWING the increased prominence into which the East has been brought by such events as the Melbourne Race and various individual flights, private owners are showing an ever-growing interest in the possibilities of flying to Baghdad or beyond. The problems they will have to face have been investigated on behalf of *Flight* by Lt. Cdr. G. N. Colson, R.N., who recently made such a journey by air, and in next week's issue he will describe the first stages.

THE EMPIRE ROUTES

Some Important Points from Lord Londonderry's Speech in the House of Lords : Building a Firm Foundation for Future Developments : A Reply to the Critics

SOME extremely interesting and important statements were made in the House of Lords on Wednesday of last week by Lord Londonderry, Secretary of State for Air. They arose from questions regarding Empire air services, put to him by Lord Moyne.

Lord Londonderry opened his speech with a condemnation of the ill-informed lay-Press criticism of Britain's Melbourne Race success, and then proceeded to deal with the first of Lord Moyne's questions—whether he, Lord Londonderry, was aware that a foreign line offered a faster service to the Far East than that provided by Imperial Airways.

Lord Londonderry said he was aware that it had been publicly stated that K.L.M. operated a five-day service to Batavia, but the statement was wholly incorrect, and, in fact, the schedule for this service was eight days in summer and nine days in winter, as compared with an eight-and-a-half day schedule all the year round by Imperial Airways to Singapore. It was doubtless true that as the foreign line concerned was re-equipped with new aircraft it would curtail its present schedules. Imperial Airways intended to do the same as they replaced their present fleet.

Lord Moyne's next questions were whether, in the present subsidy arrangements, any condition existed as to speed of service; whether any extension of the subsidy period was contemplated; and whether, in case of such extension, the Government would consider imposing such conditions.

The answer, said Lord Londonderry, was that the present agreements with Imperial Airways for their Indian and African services did require that, to count for subsidy, flights should be completed within a certain period of time. But as these agreements were concluded several years ago the periods of time allowed had in the natural course been greatly improved upon by Imperial Airways in actual practice. If and when any new agreements were concluded with the Company—the first would not expire until 1937—appropriate minimum conditions would certainly be insisted upon. They would not, however, necessarily take the form of a requirement of so many miles per hour, but of the time taken to convey passengers, mails and goods from one point to another.

Demand for Comfort

This issue of speed was first raised with him several months ago in the light of the performance of the fast new machines which Air France had brought into service on their cross-Channel services. Yet during the four months from July to October Imperial Airways carried three times as many passengers as Air France in the two directions between London and Paris. This fact suggested that speed, *beyond a certain point*, was by no means the only thing looked for by would-be travellers by air. They looked also for safety, for comfort and for regularity. He suggested that our commercial air transport system must cater for the average rather than for the exceptional passenger. On long-distance routes, as schedules were speeded up, and more and more of the twenty-four hours was spent in actual flight, the average passenger would demand an increasing degree of comfort.

"When we are carrying three times the number of passengers on a route on which we are in direct competition with a powerful rival," said Lord Londonderry, "whilst we must avoid any undue degree of complacency, we certainly need not allow ourselves to be rushed into extravagant panic measures in the blind pursuit of mere speed. That is not, of course, to say that we must not

take advantage of each fresh technical development and insist, when existing fleets are re-equipped, on a substantial increase in speed. Just because the re-equipment policy of other companies falls at a different period from our own, we should not immediately write-off our existing aircraft. That would be a policy which could only end in bankruptcy and disaster."

Lord Londonderry pointed out that nearly 91,000 passengers travelled by air between England and the Continent in 1933, and of these 53,500 were carried by British aircraft as compared with 37,500 by all foreign lines in combination—including French, German, Dutch and Belgian. Transferring the basis of comparison to the world operations of British and French air transport, what did they find?

During the year 1933 Imperial Airways carried a larger mail, a larger passenger and a larger total ton-mileage than the French; and, whereas Air France showed a loss at the yearly rate of £1,300,000, excluding subsidy, the corresponding figure for Imperial Airways was less than £450,000. Last year the ton-mileage carried by Imperial Airways was nearly 90 per cent. greater than that carried by the Dutch, and more than 100 per cent. greater than that carried by the Italians. Lastly, during the first five months of this financial year Imperial Airways ton-mileage showed an increase of a third on the corresponding figure for 1933.

American Conditions

Turning to America, there was widespread misunderstanding of the course of events over there. Geography gave the United States a unique field for the development of internal air transport—and the conditions which had governed this development were quite unlike anything else in the world. Our Imperial air services—though they had different potentialities which were just as far-reaching—could never operate under such favourable conditions. The service to Australia would traverse eight foreign countries, and Britain obviously could not dictate to those countries what their ground organisation should be. [This is a point to which *Flight* has more than once drawn attention.—ED.] Again, petrol, the largest single item in air transport costs, was obtainable at about 7d. a gallon in the United States as compared with something like 2s. 6d. in the case of Imperial services as a whole.

Nor must the enormous sums which have been spent on the development of civil aviation in the United States be overlooked. In 1933 the net loss to the United States Post Office (in other words, the direct subsidy) was in the neighbourhood of £4,750,000. The American Government's expenditure on the development of civil aviation, in the seven years from 1927 to 1933 inclusive, reached the staggering total of £25,000,000. The American technical achievement in this field had indeed been striking, but seemed to have been dearly bought. A number of machines of outstanding performance were used in America, and over one or two routes there were express services with very fast schedules. Erroneous as had been many of the schedule figures quoted, the American air transport industry had been artificially stimulated by a vast expenditure of public money—and by a long series of boom flotations through the medium of which the small investor, to his great detriment, poured millions of dollars into the manufacturing industry—with the result that some remarkable aircraft could be used, though under conditions wholly different from those governing our Imperial air services.

But what was the *economic* condition of air transport

in the United States of America? Earlier this year the American Government apparently reached the conclusion that even the United States Exchequer could not continue its lavish expenditure on civil aviation, and that the Post Office could not continue to carry such enormous annual losses. In consequence, the air mail contract rates were reduced. The result was that leading representatives of the air transport industry, in evidence before the Commission only last month, frankly stated that they were on the verge of ruin. He would give the actual words of three of the leading witnesses.

The first stated that the companies "were facing huge monthly deficits" and that there was "no visible possibility of profit." The witness said: "Most, if not all, of the present companies carrying mail, express, and passengers by air in the United States can continue only so long as their capital reserves hold out or until their officers and stockholders are no longer willing to permit the continued rapid dissipation of their money." The evidence of the second was equally emphatic. He, too, said that with some exceptions "the aggregate result of the last few years of intensive effort . . . has been substantial financial losses." The third, giving evidence as recently as the 18th of last month, stated that "at the present rate all the lines will be in bankruptcy not later than June 30th, 1935."

Were these the methods which Britain was asked to emulate? Her problem was fundamentally different from that of internal air lines in the United States, and they should recognise the fact and shape their plans accordingly. Indeed, when they turned to American *external* air transport they saw that the Americans had found themselves confronted by very similar problems to those with which Britain has had to contend. In this field America had regarded as inevitable the use of types of aircraft different from those employed on internal services, and, in consequence of this and other factors, had accepted the necessity for materially slower time schedules. [This is another point to which *Flight* has drawn attention.—Ed.]

Colonial Co-operation

Lord Londonderry went on to say that in any scheme for the development of Imperial air communications, Britain had to act in the closest co-operation with her Dominions and Colonies, and the time was not yet ripe for him to make any detailed statement of plans. He would therefore confine himself to saying that they were drawn up long before the Melbourne Race and that they allowed for a seven-day schedule between this country and Australia—that, incidentally, was reported to have been suggested by the K.L.M. as a practicable time schedule with the Douglas machine about which they had heard so much. In due course Britain hoped to improve even on that programme.

The Douglas machine, while undoubtedly a remarkably successful one, which reflected the greatest credit on its designers and constructors, was, save for certain limited purposes, quite unsuitable for use on Imperial air services, where the present aim was to achieve a paying load of

3½ to 5 tons, under conditions in which the Douglas would give less than half that load. Nine months ago they at the Air Ministry were considering the advisability of the purchase of one of these machines, because of its great technical merits. They decided the purchase was not worth while. They had, in fact, purchased another equally interesting machine of American design and manufacture.

They must continue to aim at getting British air transport eventually on a firm commercial basis, though they must be prepared to assist it financially for a longer period than was contemplated ten years ago, and very possibly on a more liberal scale. Having formed that view, he had, with his advisers, and in continuous consultation with the Postmaster-General—for one of the main instruments for the furtherance of Imperial air transport, the mail, fell within his province—been co-operating with the Board of Imperial Airways for many months past on far-reaching plans of development.

Long before the recent race they had completed their plans for nearly halving the schedule on the Australian service. They were now aiming at similar accelerations to South Africa and to the Colonies. They aimed at faster aircraft, greater frequency, greater comfort, and a further development of air mail traffic.

Striking a Balance

But all these things they planned to achieve without destroying that approach by Imperial Airways to a commercial basis of operation which had been so steadily proceeding for the past ten years, under the prudent, but always progressive, direction of its very able chairman, Sir Eric Geddes. Their object was to lay solid foundations which would endure. It was a question of striking a balance between those speeds of operation which were *technically* and those which were *economically* feasible. They would not shrink, if need be, from recommending a larger public contribution to civil aviation for the next few years—provided they were clear that they were getting results which justified that expenditure. They regarded it as a thoroughly healthy sign that the percentage of subsidy to Imperial Airways' total receipts had been steadily falling year by year until it was now under 45 per cent.; he would add that the revenue received by the United States Post Office on American external air services in 1933 was no more than thirteen per cent. of its expenditure. They regarded it as a matter of satisfaction, not for lamentation, that the present subsidy to Imperial Airways per ton-mile carried was markedly lower than in the case of the French, the Italians, the Germans or the Americans. If these facts had meant a declining share in the world's air traffic, he would go a long way towards agreeing with the critics, but so far the reverse was the case.

Lord Londonderry concluded by saying that it was in no spirit of complacent satisfaction that he had reviewed Britain's past achievements, but in the light of the facts there was no shadow of justification for panic measures based on feverish exaggerations.

Diary of Forthcoming Events

Club Secretaries and others are invited to send particulars of important fixtures for inclusion in this list.

Nov. 16-Dec. 2. 14th International Aviation Exhibition, Grand Palais des Champs-Élysées, Paris.

Nov. 29. "Engine Research." R.Ae.S. Lecture by Capt. A. G. Forsyth.

Nov. 30. Yorkshire Aeroplane Club Annual Ball, Hotel Majestic, Harrogate.

Dec. 1. De Havilland Works Annual Dinner, Wharncliffe Rooms, London.

Dec. 4. College of Aeronautical Engineering, Annual Dinner and Dance, Grosvenor House.

Dec. 6. "Flaps and other Devices." R.Ae.S. Lecture by R. P. Alston.

Dec. 6. "Recent Progress of the Autogiro." R.Ae.S. Lecture by Senor Juan de la Cierva. POSTPONED to Second half of Session.

Dec. 7. Martlesham Heath Annual Dinner.

Dec. 13. "Recent Research in Metallurgy." R.Ae.S. Lecture by Dr. W. H. Hatfield.

Dec. 15. York County Aviation Club, Christmas Dinner Party the Club House.

Dec. 18. Herts and Essex Aeroplane Club Annual Dinner and Dance, Park Lane Hotel, Piccadilly, London.

Dec. 19. Banquet and Dance in honour of Mr. C. W. A. Scott and Mr. T. Campbell Black, Grosvenor House.

Dec. 29. Association Football, R.A.F. v. Oxford University, at Ilford.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS



A NOTABLE WEDDING: Mr. Alan Muntz, joint managing director of Airwork Ltd., Heston, who was married last week to Lady Margaret Stewart, daughter of Lord Londonderry, Secretary of State for Air. This snap shows him entering his new car shortly before the ceremony. Later Mr. and Mrs. Muntz left for the Continent, and were reported to have arrived at Nice by air.

Dutch Pilots Return

Parmentier and Moll, who were second in the speed event and first in the handicap of the England-Australia race, arrived back in Amsterdam in their Douglas D.C.2 on Wednesday of last week. They were accorded an enthusiastic welcome from nearly 100,000 people, and were received by Lt. Roemer, representing Queen Wilhelmina.

Lord Sempill in Australia

Lord Sempill, who left England towards the end of last month in his D.H. "Puss Moth" ("Gipsy III") to fly to Melbourne for the Centenary Celebrations, reached Australia last week. After crossing the Timor Sea he landed at Bathurst Island, but did not proceed immediately to Port Darwin, where they were awaiting his arrival, as he wished to inspect the emergency landing ground there, and also to see the Aborigines in their native state. As a result, some anxiety was caused at Darwin by his non-arrival, until the news of his landing at Bathurst came along later on. However, he arrived at Darwin on November 21, and proceeded on his way towards Melbourne. On Sunday night he had to alight on Portsea Beach, near

Port Phillip Meads, owing to lack of petrol, and in landing in the dark the machine was slightly damaged. He reached Melbourne next day.

"Smithy's" Next Venture

Sir Charles Kingsford-Smith is planning to fly from California to Honolulu and the Philippines.

A "Graf Zeppelin" Model

A model of the *Graf Zeppelin* has been constructed for the Science Museum, South Kensington, and has been placed in the National Aeronautical Collection.

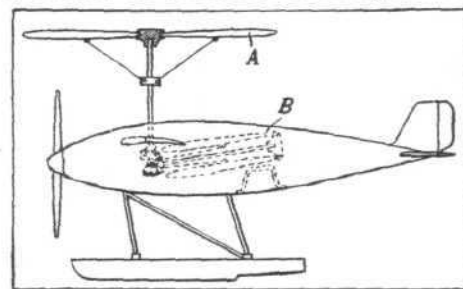
Race Round the World

At the Paris Aero Show it is announced on the stand of the Civil Pilots' Union, that the French paper "Le Journal" intends to organise in 1936 an air race round the world. Details have not

been definitely decided, but it is expected that the route will go from Paris to Japan and from there to San Francisco. Here the route will split into two, one going via Central America across to Africa and back to Paris, and the other via New York and the Atlantic.

Strange Dornier Patent

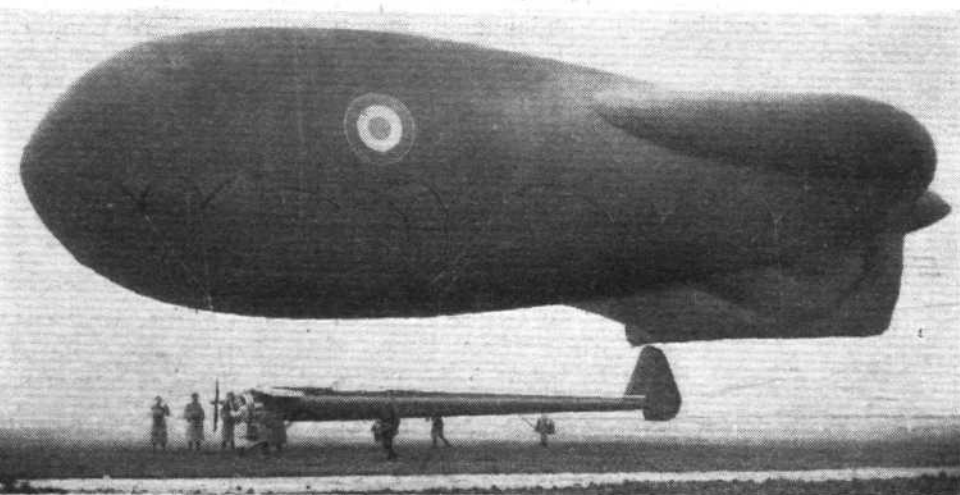
An unusual application of the Autogiro is embodied in a recent patent by the well-known Dornier firm of Friedrichshafen. This patent—of which we give a sketch—is intended to mitigate the



dangers of rising and landing with normal type high-speed aeroplanes fitted with small wings. The inventor adds a pair of rotary wings, "A," which help the lift at low speeds, but the rotor blades can be folded, like an umbrella, and then "retracted" into the fuselage, as shown in "B," for high-speed flight.

By Autogiro to the Cape

After being held up several days by fog, the Hon. Mrs. Victor Bruce left Lympne at 7.50 a.m. on Sunday in her Autogiro en route for the Cape via the West Coast Route—the longest flight that has ever been attempted on a machine of this type. With a brief halt at Le Bourget, she arrived that evening at Dijon. No further news was available by Tuesday evening.



BELISHA BALLOONS? This little dirigible balloon, or "Saucisse Motorisée" ("motorised sausage"), has been used by the Paris police for photographing and filming the Paris traffic at congested points to assist in solving their traffic problems. It is fitted with a 60 h.p. engine, and can be operated either as a dirigible or as a captive balloon. Perhaps our Mr. Hore-Belisha might be tempted to make a few experiments!

OLD SARUM

THE SCHOOL OF ARMY CO-OPERATION

By

Major F. A. de V. ROBERTSON, V.D.



WHEN the original four squadrons of the Royal Flying Corps (Nos. 2, 3, 4 and 5) accompanied the British Expeditionary Force to France in August, 1914, there was only one idea in anybody's mind about their employment. Their work, naturally, was what is now called army co-operation, but only one branch of what is now included in that term, namely, reconnaissance. The business of the aeroplanes was to see and report what the enemy and our own troops were doing. No one then had any idea of using aeroplanes for photography, although this is a normal development of reconnaissance, or for spotting for the guns, still less for bombing or for fighting in the air. Generals and their staffs soon came to value the reports from the air, and a few months later no important operation was undertaken without a preliminary report by the R.F.C. It is interesting to note that of the four original squadrons three (Nos. 2, 4, and 5) are still engaged on army co-operation work.

The Royal Air Force has now a multitude of functions to perform, and army co-operation remains one of the most important of them. There are in the Service ten army co-operation squadrons, five in Great Britain, four

in India, and one in Egypt. Before an officer is posted to one of them he is put through a course of very thorough training in the work, very highly specialised work, which they have to do. The School of Army Co-operation at Old Sarum exists to give officers that training.

Usually the officers come straight to Old Sarum from their flying training schools or from Cranwell. They may first have been to their own squadrons to report, but the squadrons cannot employ them in combined exercises until they have been through the course at the School; so no time is lost in sending them there. Of course, they have already been taught to fly, and at either Cranwell or Uxbridge they have been instructed in the general duties of an officer, but that is not nearly sufficient for the squadrons. Flying is merely the beginning of things, the tools, so to speak, with which a carpenter makes something. The officer of an army co-operation squadron has to become one of the most highly trained specialists in the Service.

The ordinary course at the School takes twelve weeks, and there are twenty pupils at each course. There are three courses in the year. The syllabus is divided into ground instruction and flying. Everything taught on the ground is practised in the air at the earliest opportunity. Weather permitting, flying takes place on Monday afternoons, on the whole of Tuesdays and Thursdays, and sometimes on Friday afternoons. The rest of the week is devoted to ground instruction.

The subjects studied are (1) Air Reconnaissance, including map reading and writing reports in the air. (2) Artillery Reconnaissance. (3) Photography, which means operating the air camera and flying so as to get the proper results. (4) Signals, namely wireless telegraphy and radio telephony. (5) Military Organisation and Tactics. Of these, Air Reconnaissance is a very wide subject. The pilot is given a tract of country to reconnoitre, and he must learn to see and recognise everything of military importance within that area. He has



OLD AND NEW: A "Rota" flying over the ruins of Old Sarum. The outlines of the old Cathedral appear in the left bottom corner. (Flight Photo.)

THE PUFF TARGET : Practising artillery reconnaissance. The "Audax" is flying low so as to appear in the photograph. Small smoke cartridges are exploded on the ground to represent shell bursts round a target, and the pilot sends down W/T messages to correct the aim. (*Flight Photo.*)

previously been given an explanation of the military situation and knows more or less what to look for, and he must report the position and movements of the enemy and occasionally of the troops of his own side. He would not be able to do all this satisfactorily but for his very thorough study of military organisation and tactics. He must be able to recognise the various arms, cavalry, infantry, artillery, tanks, and supply services, when at rest and when on the move. He must be able to estimate places in his area where he is likely to find concentrations, battery positions, etc. All the time that he is reconnoitring he is constantly sending down wireless reports of what he sees to the ground, and at the same time he is writing his own reports, timing each entry, which he will hand in after landing. When engaged on artillery reconnaissance, he works by W/T, one way, from air to ground, sending down his observations of the shell fire after each salvo by code, and each signal is received by an airman wireless operator attached to the battery. When engaged on photography he has to make each exposure himself, for automatic cameras are not used. Printing and developing, however, are not his business. They are done by the photographic section.

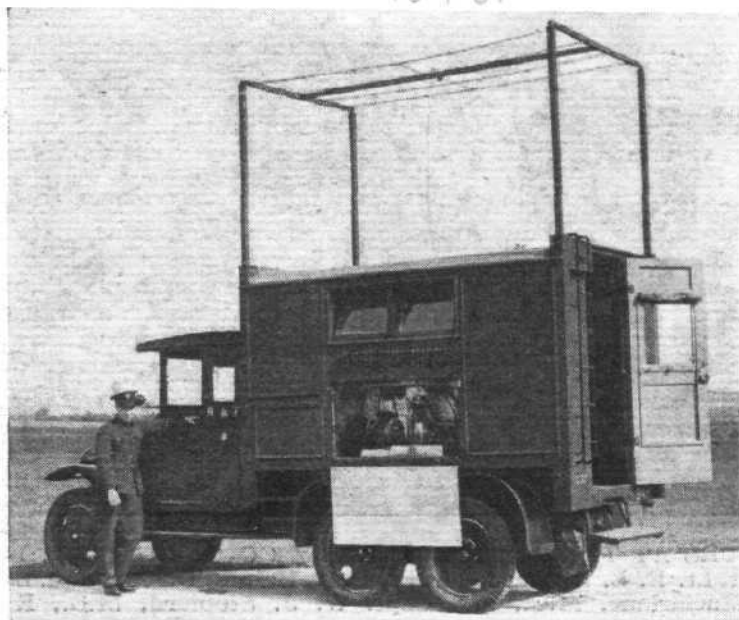
The question is sometimes asked by the uninitiated, why does not the man in the back seat relieve the pilot of some of these duties? During the war an observer was carried, whose primary duty was to observe, while he also operated the signals. Then the pilot flew as the observer directed him, and concentrated his attention on piloting the machine. The whole theory is now different. The pilot is not considered an overworked man. The piloting of the machine must be done almost automatically, without his having to think about it, and it is not counted among his anxieties. He concentrates on his reconnaissance, his signals, and his report writing. But he cannot give his whole mind to these matters if he is in any anxiety about his safety from an air attack. His reconnaissance is not

likely to be complete if half his attention is given to looking out for possible enemy aircraft which may attack him. Therefore the man in the back seat is an air gunner pure and simple. He is the sentry who keeps a look out for enemy aircraft, and so relieves the pilot of any anxiety on that score. The psychological benefit to the pilot is tremendous.

Obviously, during the twelve weeks of his course the pilot has to soak himself in military tactics, until he can think with the mind of an Army staff officer. This most important subject is taught by an Army officer on the staff of the School. Probably the pilot knows nothing at all about the commanding of a company or a platoon, but at the end of the course he has very considerable knowledge of the ways of a brigade and a division. The officers do Army "schemes" on the ground during their course, they visit the School of Artillery at Larkhill and witness



A LINE-UP : Hawker "Audax" machines (Rolls Royce "Kestrel" engines) of the School of Army Co-operation. (*Flight Photo.*)



WIRELESS : On the left is a wireless lorry with its aerial, and on the right operators are seen at work inside the lorry. (*Flight Photos.*)

shoots, and whenever possible they go to Tidworth and see some operations carried out by armoured cars, tanks, cavalry, and infantry.

At the School at Old Sarum there are elaborate dummy ranges and targets for practising reconnaissance on the ground under the eye of the instructor. The Haskard range, called after its inventor, Lt.-Col. Haskard, R.A., is a particularly fascinating affair. It is a map of painted canvas, showing a tract of country—in this case the basin of the river Wallop—made to scale but with elevations exaggerated. Buildings, trees, etc., are fastened on to the canvas. The map is suspended about six feet off the ground and the pupils stand in a gallery overlooking it. The instructor and one of his assistants stand below the canvas, and by means of magnets move tanks or other Army forces about on the map, either along the roads or across country. The pupils have to write reports of what they see. At first it is not too easy to spot anything, as the scale represents a view from about 4,000 feet. When the eye has grown quick at spotting movements, then the range gives useful practice in the routine of writing reports.

The picture target is used for practice in artillery recon-

naissance. It is built solidly on the ground, and is wired underneath. A pupil acting as battery commander lights little electric bulbs to represent shell bursts, and another pupil, acting as pilot, is trained in the right method of sending down observations until he has brought the battery right on to the target. The puff target (of which a photograph is given in this article) is for a similar purpose, but in this case the pupil is actually in the air. The operator on the ground explodes groups of small smoke puffs on the ground to represent the shell bursts, according to the corrections sent down by the pilot in the aeroplane. The Coryton range is another device for training in artillery reconnaissance. This is built up of mud and painted to represent a tract of country. In this case pellets are fired from small bore rifles, so that the pupil has to spot the tiny cloud of dust thrown up. All these devices are useful for training the eye and teaching procedure, but they do not take the place of practice in the air.

In addition to this normal course for training officers for the A.C. squadrons, the School holds courses for higher commanders in the Army, who come for a week or ten days and learn to understand the air point of view



PHOTOGRAPHY : On the left an airman is handing up a camera to be fitted inside an "Audax"; on the right a Warrant Officer is making a mosaic of the prints. (*Flight Photos.*)

of war. It is very important that the higher command of the Army should have a sound working knowledge of the possibilities and limitations of the aeroplanes which work with it. Another course of three weeks is held for officers of the Army who are drawn from the infantry, cavalry and artillery. After passing this course, these officers are attached to A.C. squadrons as Intelligence Liaison Officers or Squadron Artillery Officers. Each A.C. squadron has one I.L.O. and one S.A.O. attached to it to maintain liaison with the Army commands.

A recent innovation at the School is a course in flying the "Rota" (i.e., the R.A.F. Autogiro C.30). This machine is at present only used for communications, mainly for carrying staff officers about. Some day it may be used for reconnaissance. Each of the five A.C. squadrons in the country sends officers to the School for instruction in flying this machine.

It should not be forgotten that among the pupils at the ordinary courses there are a proportion of officers of the Army who are seconded to the R.A.F. as pilots with A.C.



INSTRUCTORS AT THE SCHOOL OF ARMY CO-OPERATION: Left to right—Flt. Lt. E. L. S. Ward, Flt. Lt. H. A. Haines, D.F.C., Sqd. Ldr. R. M. G. Macfarlane, M.C., and Capt. W. J. Stopford, M.C., R.A.

squadrons. These officers are taught to fly at Leuchars with the Navy pilots of the Fleet Air Arm. After serving in the R.A.F. as pilots for four or five years, these officers return to their units with a knowledge of the air which will be of great value to the Army and to themselves.

THE PARIS SHOW

Second-week News : Exhibitors Report a Satisfactory Number of Enquiries

THE second and last week of the Paris Show opened under very favourable conditions. The attendance since the beginning of the exhibition has been surprisingly large and has surpassed, it is officially stated, by 30 per cent. that of the last (1932) Salon for a similar period.

Visitors have appeared to show a much more intelligent interest in the exhibits. While, perhaps, there has not been a great many actual sales effected, a number of firms declared themselves well satisfied with the enquiries.

Several outside factors have assisted during the past week in attracting the general public to the Show. A kite-balloon hovered for several days over the centre of Paris and the Grand Palais—to observe and photograph, it was stated, the city traffic. Fitted with a fuselage-like car instead of a basket, this curious hybrid was sometimes to be seen floating slowly along under the influence of a

40 h.p. radial engine; at other times it was towed at the end of a cable attached to a winch on an army lorry. It is illustrated on p. 1276.

An Autogiro (Armstrong Siddeley "Lynx") of the C.30 type, constructed by the British Cierva Autogiro Company, also took off from the street in front of the Grand Palais last Friday morning about 9 o'clock and, after encircling about half a dozen times around that building, landed again exactly in front of the main entrance. The machine was piloted by Roger Lepreux.

Liore et Olivier have acquired the Cierva licence for France and will shortly begin active construction of autogiros which they will equip with Salmson 175 h.p. radial air-cooled engines. Their engineer, George Lepere, has been in England for several months making a study of the constructional methods employed by the British company, as has the pilot Roger Lepreux.

A SHEFFIELD DINNER

ONCE a year the letters A.I.D. alter their significance for those in Sheffield and the surrounding district; instead of bringing to the mind release notes and rejected test specimens, they conjure up a picture of good fellowship between Air Ministry Officials and the Sheffield firms—at the Approved Inspectors' Dinner.

Last Thursday was no exception, and close upon two hundred directors, approved inspectors, Air Ministry officials and guests listened, after dinner, to acknowledgements of the excellent relationship which exists between the Air Ministry's Directorate of Aeronautical Inspection and the inspection staffs of the many firms around Sheffield which, mainly as producers of steel in various forms, constitute a large part of the huge industry producing aircraft materials.

Mr. P. B. Henshaw, of Kayser Ellison, gave a brief outline of the early days of the A.I.D. in Sheffield, when they used his works as their offices. Mr. Lindley, Chief A.I.D. Inspector at Sheffield, in the course of his reply to Mr. Henshaw's toast to the A.I.D., said that the scheme whereby certain of each firm's inspection staff were approved to act as A.I.D. inspectors, had worked far better than anyone had thought it would do. He also discussed the committee which had been formed—of Approved Inspectors and the A.I.D.—to smooth over difficulties, and said that during the past twelve months they had not had a "grouse" to deal with!

Lt.-Col. H. W. Outram, Director of Aeronautical Inspection, in proposing the health of the Approved Inspectors, gave a short history of the scheme which started in 1921 when the firm of Accles and Pollock were approved, and emphasised the importance of adequate inspection of material, as it was the basis of all aircraft construction. He also pointed out the regrettable tendency on the part of both engine and aircraft designers to blame the material manufacturer when any part failed and to demand better materials, instead of looking more closely into their design and seeing how they could make satisfactory parts with the material they had—a procedure which would decrease aircraft manufacturing costs.

Mr. Harry Brearley, of Brown Bayleys, and the original inventor of stainless steel, explained that he was the first approved inspector in Sheffield, having been given that status in 1923. He asked for simplification of specifications and for less restriction of the tests required, and even for the elimination of some of them.

All the speakers followed the example of the Chairman, Mr. A. B. Winder, general manager of the English Steel Corporation, and referred in heart-felt and sincere terms to the very recent death of Mr. J. H. S. Dickinson, who held the position of chief metallurgist of the English Steel Corporation and had done so much for Approved Inspection and the Aircraft trade. Mr. Dickinson died suddenly on November 16.

The AIRCRAFT ENGINEER

"FLIGHT" ENGINEERING SECTION

Edited by C. M. POULSEN

No 106 (Volume IX)
No. 11 9th Year

November 29, 1934

METAL CONSTRUCTION AT THE PARIS SALON

By MARCUS LANGLEY, M.I.Ae.E., A.M.Inst.N.A.

Mr. Langley, who is Instructor in Design at the De Havilland Aeronautical Technical School, is also the Author of the book "Metal Aircraft Construction": In the following article he records his impressions of this year's Paris Aero Show

THE succession of Paris Shows every two years gives us a series of checking points from which we can gauge the development of the aircraft industry in Europe. My first object in visiting the exhibition this year was to see what had happened in structural design, and to judge or speculate on the effects that any changes might have on main designs and on production problems.

In the Salon of 1932 there were evidently two schools of thought corresponding roughly to the English and French industries. The first, represented only by small military machines, had developed the wire-braced fabric-covered structure to perfection. It might be said that there was nothing in the layout of the machines as such which called for metal construction. The mere designs could have been executed in wood, though perhaps with more weight and a shorter life. The exhibits were very impressive in their simplicity and cleanliness, and there appeared to be little more development possible in the corrugated strip steel spar. The French, on the other hand, were developing metal-clad structures in duralumin, and it was giving them an opportunity to create types which would have been very difficult, if not impossible, to build satisfactorily in timber. Of course, one could see geographical and geological reasons for this in that aluminium and its alloys are much more a native product of France than of this country. In England, however, it is fair to claim that we know more of the higher tensile steels than anyone else. Each country, at that time, appeared to be developing its native products.

This year there is distinct evidence of a breakaway amongst the British firms. They, too, are now turning over to the *monocoque* fuselage and stressed skin wing.

If one considers what is also happening amongst the non-exhibiting countries, such as America and Holland, it becomes quite plain that the "metal-clad" is rising in popularity throughout the world. This is coincident with a rapid growth of commercial flying and also with the development of the low-wing cantilever monoplane. The fabric-covered wire-braced biplane still remains popular, however, in the limited class of small military aircraft.

New materials were not very much to the fore. Elektron alloys have made surprisingly little advance for structural purposes, although they may be displacing aluminium for secondary uses and in engine construction, which it is not my purpose to discuss. Stainless steel sheet has become much more popular, and although it was particularly seen on the Hawker and Bristol stands in 1932, it is now found extensively in the French, Italian and Russian exhibits as well. There is, however, a particular reason behind this for which England can take no credit. I refer to the increasing use of electric spot or "shot" welding, a process particularly suitable for the austenitic chromium nickel-steel alloys. A number of English constructors are experimenting with spot welding but their work has apparently gone little further than the making of specimens and of their mechanical testing. One firm, it was said last year, was spot welding a pair of seaplane floats in stainless steel. At the Paris Salon, however, there were already two very large floats made by different French manufacturers. There was a complete Italian flying boat and a Russian landplane in which spot welding was used throughout. It may be that we in England are not far behind in the use of this process, but if so we are keeping very quiet about it. The large Mureaux float made of stainless steel sheet was very impressive. The stiffeners were

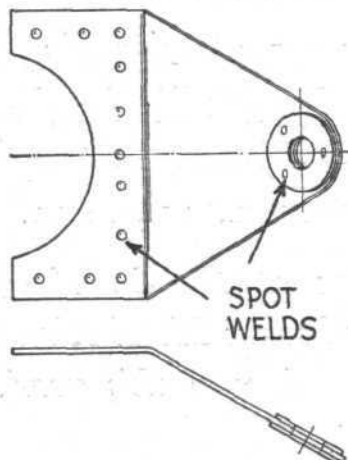
THE AIRCRAFT ENGINEER

probably welded to the shell plating on a fixed welding machine before erection. The final assembly would make use of the specially designed long-armed welding pincers.

The Savoia-Marchetti which appears in the Salon is the second to be built with Budd shot welding. The first, which was built about three years ago, is now, I understand, back in America after its European tour of 1932. This machine has a two-spar fabric-covered wing structure which is conventional in its conception. But welding is used instead of riveting throughout. The material is thin stainless steel strip. The wing floats are built directly on to the underside of the lower plane. The hull is completely welded together and made of stainless steel sheet and strip. This material has certain evident advantages on account of its corrosion-proof properties and also because it is extremely simple to spot weld. The finished article is very smooth and clean and requires no painting. One might expect, however, that when one came to building a large flying boat it would be difficult to get sufficient rigidity with the thin sheet which would be necessary if the weight were to be kept within reasonable proportions. On the bottom of the hull, for instance, there are such loads when alighting in rough water that the extra bulk of a lighter alloy would give greater robustness.

The Russians have made a particularly courageous effort in the use of electric welding on their Stal 2, which was shown on the stand of the U.S.S.R.: the machine was designed by Poutiloff. The structure is entirely of stainless steel but is covered with fabric.

In layout it is a conventional high-wing semi-cantilever monoplane. The fuselage sides are vertical Warren girders, joined together across the top and bottom by struts with cross-wire bracing. The courage in this design lies in the use of welding in the fabrication of every part. The fuselage longerons and struts are of a section which is familiar to us in the work of the Bristol Company—



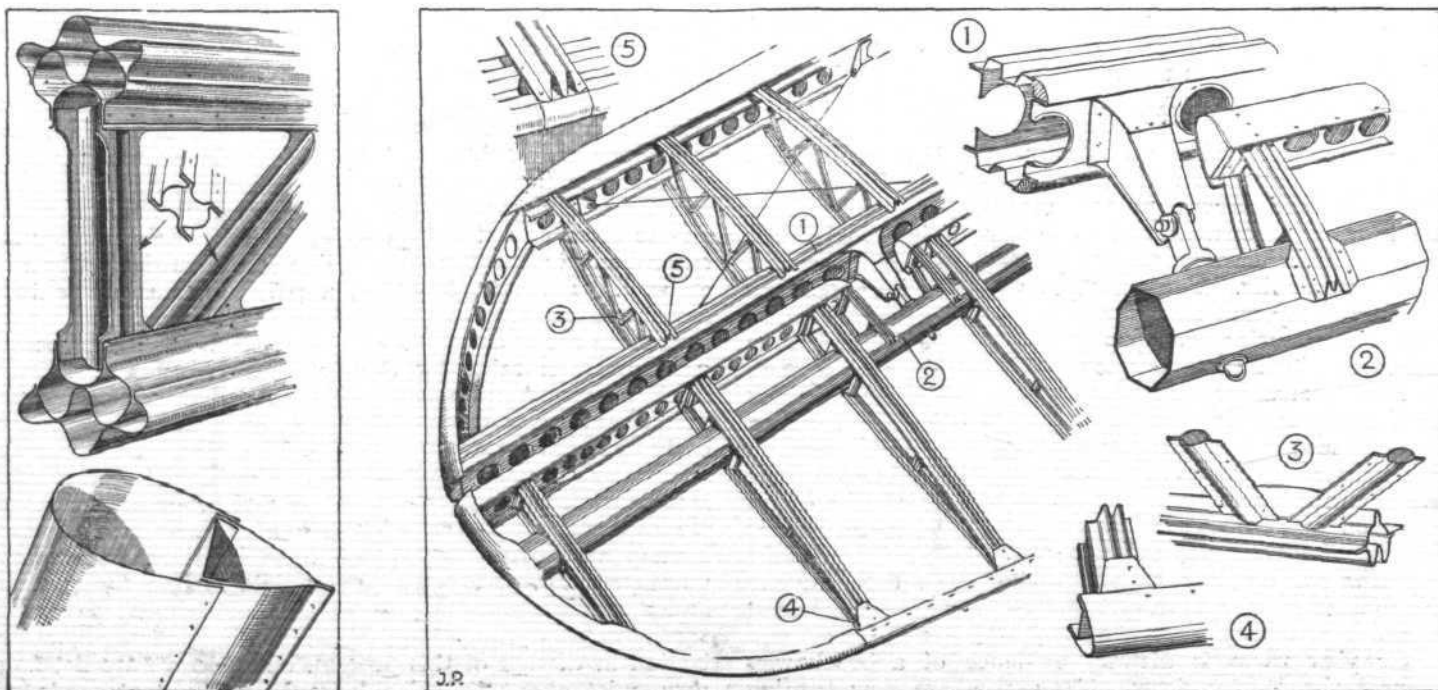
A wiring lug on the Stal 2.

that is to say they are built up of corrugated strip tubes, but where the Bristol Company has used riveting or a wrapped joint, Poutiloff has used welding. The nodal joints in the structure are made up somewhat after the manner of the "Fairey spool," joined with bolts. The great criticism that I would make is of the workmanship, which in places would not have been passed by British Air Ministry Inspectors. One might also have doubts about the soundness of attaching wiring lugs to the spars by the method shown.

Spot-welding Duralumin

On going up into the balcony I found yet more spot welding on a small stand belonging to the Sciaky Company. Possibly I should have known it before, but the name was new to me. What particularly took my attention was a fin or some such small unit evidently built of duralumin and yet spot welded, which was leaning in the corner of the stand. I made further inquiries and found that this firm has supplied machines to practically all the French aircraft constructors, and that their English Company is responsible for the equipment of the Vauxhall car body works. Apparently Sciaky welding is used throughout in the Vauxhall pressed steel car-body and chassis. They claim to have developed a successful technique in the spot welding of duralumin. The secret of this lies in the very short time given to the actual passage of the current, perhaps as small as one-tenth of a second, and associated with this a particular method of applying a variable mechanical pressure between the electrode points. The actual welding takes place at a temperature of about 550°, which is above the critical range of material. This overheating is very local, owing to the high conductivity of duralumin, and at the moment when the current is passing the mechanical pressure is relieved. It is exerted again as the current is cut off and this working is sufficient to retain the strength. The tabulated figures have been developed not in the laboratory but in the workshops of one of the leading French constructors.

If rivets had been used of a size appropriate to the thickness of the sheet one rivet would have given about the same strength as one spot weld. This, however, is a very unsatisfactory comparison because welds can more easily be pitched closely than rivets. The possibilities of the method are enormous. One of the great objections which



RUSSIAN SPOT-WELDING: Wing and tailplane details on the Stal 2. Note the unusual spar booms. The numbers in the large drawing refer to the detail insets.

THE AIRCRAFT ENGINEER

TEST RESULTS

SHEARING AND TENSION OF WELDS IN LIGHT ALLOYS AND STAINLESS STEEL.

1.—LIGHT ALLOYS.		Thicknesses.		Strength.
(a) Shearing		in.		lb.
Duralumin	.. ..	.039	+ .039	265
"	.. ..	.0315	+ .0315	199
Aluminium	.. ..	.039	+ .039	132.5
"	.. ..	.0315	+ .0315	110.2
Dural. + Alum.	.. ..	.039	+ .039	199
"	.. ..	.0315	+ .0315	155
(b) Tension.				
Duralumin	.. ..	.039	+ .039	121.5
Aluminium	.. ..	.039	+ .039	55.3
"	.. ..	.0315	+ .0315	44.3
Dural. + Alum.	.. ..	.039	+ .039	88.5

2.—STAINLESS STEEL.

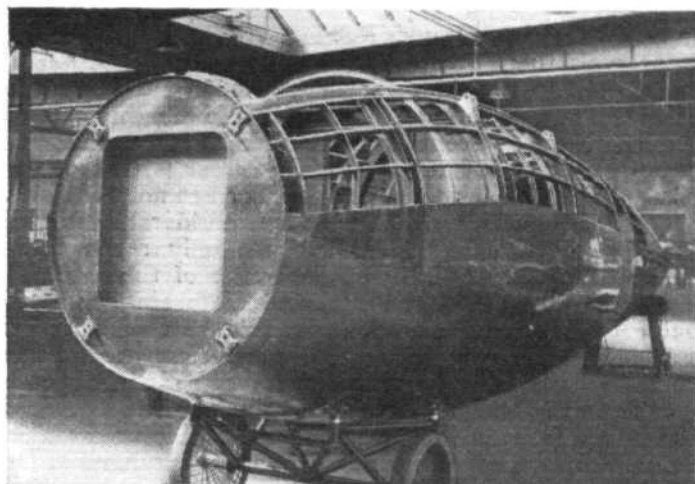
For Shearing strength, take 283 lb. for each 0.010in. of thickness, if a fixed machine is used.

Take 173 lb. for each 0.010in. of thickness, if a portable machine is used.

For example:

.0315in. + .0315in. = 885 lb. on a fixed machine. When the two thicknesses are unequal, the strength of the weaker should be taken.

.020in. + .0315in. = 560 lb. on a fixed machine.



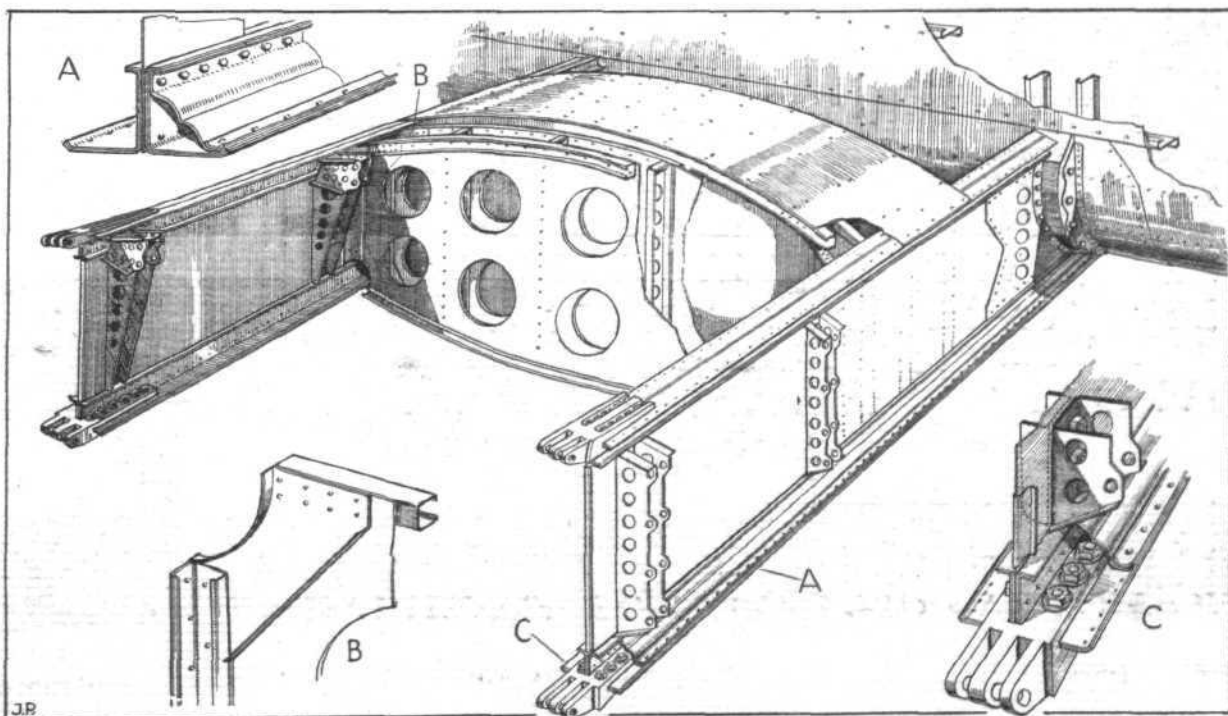
METAL MONOCOQUE: The Fuselage of an Avia 51

has been raised to the development of the *monocoque* fuselage and the metal-covered wing is in the expense of drilling the holes and closing the thousands of rivets which are required. It would seem that a more robust structure could be made in duralumin than in stainless steel, and that none of the disadvantages of riveting would occur. The work would be quick and cheap, and the finish perfectly smooth, superior in fact to that obtained with countersunk riveting.

Further experiments are being made by the Sciaky Company both in England and in France, and one may venture to forecast that the spot welded duralumin *monocoque* and flying boat hull have a tremendous future. It is to be hoped that no "snags" will be discovered, because the method gives us all that we could hope for.

The Bristol Aeroplane Co. Ltd., was one of the first if not actually the first firm in the world to build a metal

monocoque fuselage. That was sixteen or seventeen years ago. After a period during which they developed the steel strip structure to a high degree of perfection they have returned to the *monocoque*. The low-wing cabin monoplane which they show here in a half-finished state is probably the nearest approach to the pure *monocoque* in the whole Salon. The difference between the *monocoque* and the "metal-clad" is that the first attempts to take all the load in the skin, with a minimum of supporting structure inside, whereas the second has a substantial internal frame with the skin acting as little more than shear bracing. Whilst it is relatively easy to make the rear end of a fuselage as a pure *monocoque* there are considerable difficulties at the wing roots, owing to the concentration of load. Most constructors take these loads in a braced framework which gradually "dies down" towards the tail as the loads are dissipated. Mr. Pollard of the Bristol Co. has attempted to keep the conception of the *monocoque* pure throughout the length. The two deep main plane spars go through from side to side and each is gripped between the webs of a double frame which might almost be considered as a vertical extension of the spar to the top of the fuselage. Closely spaced stringers



BRITISH SIMPLICITY: Details of the wing roots on the Bristol 143. The letters refer to the enlarged detail views.

THE AIRCRAFT ENGINEER

run across these two frames fore and aft along the fuselage. At intervals there are transverse frames or hoops, which extend right to the skin. These are notched to allow the stringers to pass through and there are no connections between the two except that provided by the skin.

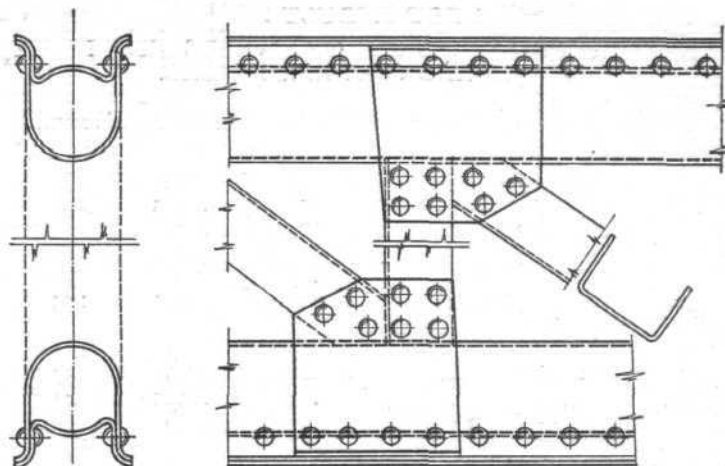
Another extremely interesting *monocoque* is that of the Avia 51. In this, however, the designer has not been able to forget his four longerons, which are considerably heavier than the other stringers. There are only seven main transverse frames throughout the length of the fuselage. One forms the engine bulkhead and there are two more double ones opposite to the front and rear wing spars. In between the main frames, however, there are smaller hoops, not attached to the skin but running round the inner flanges of the stringers.

The main plane of this aeroplane is fabric covered and in one piece from tip to tip. It has two deep duralumin spars of N girder form and drawn duralumin strip ribs. The lines of the machines as a whole are pleasing, if one can get used to a rather smaller length/depth ratio than is conventional.

Single-spar Construction

It was impossible to see the internal structure of the Dewoitine D511 metal-clad monoplane fighter. It is understood to follow that firm's standard practice. The wing has a single spar which runs across the fuselage. This is stiffened against torsion by the metal-covered leading edge, whilst the remaining two-thirds of the wing, also metal-covered, trail away behind, every rib being a tubular-braced cantilever. With this construction there must be a great concentration of load where the spar meets the fuselage, and the pure *monocoque* would be inconceivable. The stress would be too great for simple sheet to take. There is, therefore, a braced structure here which tapers out in four longerons toward the tail. Both longitudinal and transverse members are riveted to the shell plating, the transverse ones being the deeper of the two.

The Mureaux fuselages are somewhat similar, though of a more rectangular cross section. The skin acts as shear bracing for the flat rectangular panels of the sides which lie



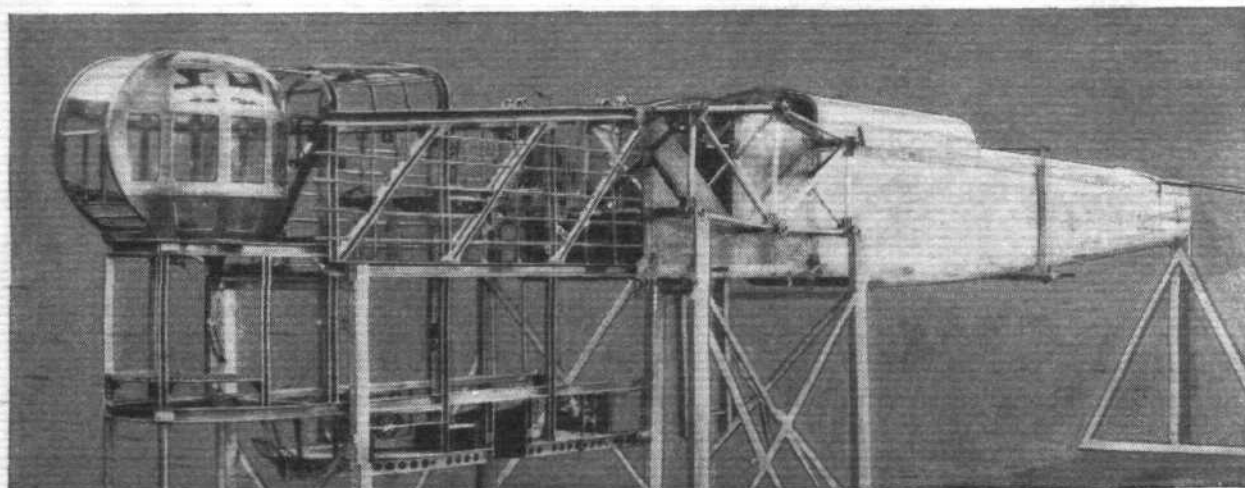
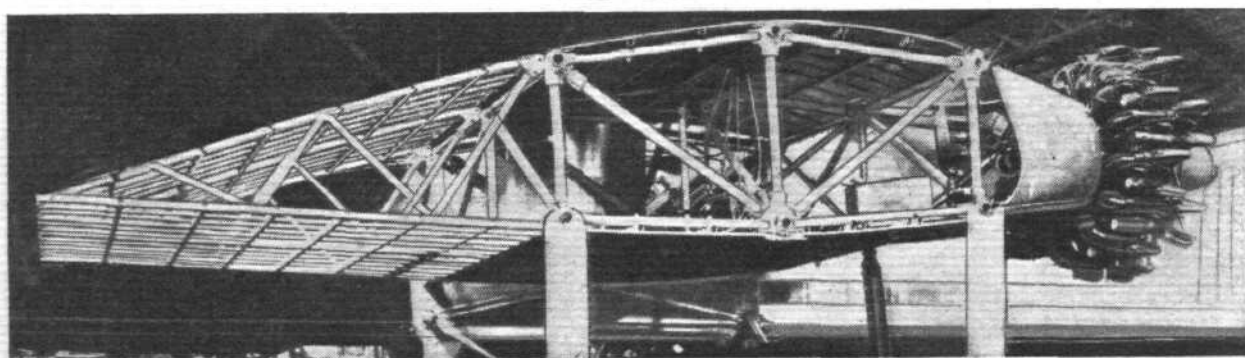
CZECH METAL WING CONSTRUCTION: The "N"-girder spar of an Avia 51.

between the longitudinal stringers and the transverse frames.

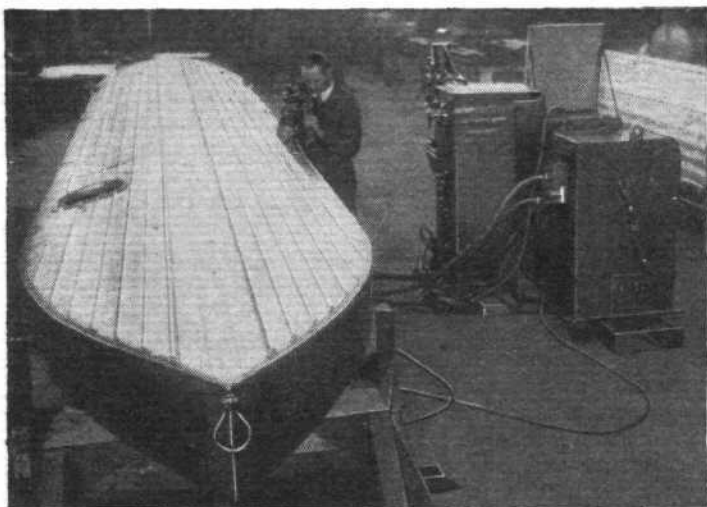
Even further from the *monocoque* but definitely within the class of the metal-clad is the big Bloch bomber. The fuselage gives an impression of straight lines and the whole structure has probably been designed by an engineer brought up in plate girder work for bridges. Although there is nothing subtle about it, an attempt was made to shroud the structural methods in secrecy. The main member of the cantilever wing is a rectangular-section box which tapers down from the centre to each tip. This has very heavy corner angles with thin sides which are stiffened by vertical Ω sections. The whole is made from duralumin or Védal, which is the French equivalent of our Alclad.

It is very difficult to write of the two big Breguet machines. The low-wing cabin monoplane, designed as a commercial transport, was unfinished and the fuselage was frankly a "maquette" or "mock-up," though well made as such. The final fuselage is to be a metal-covered structure of some sort, as is the main plane.

The Breguet 41M "Multiplace de Combat" is equally difficult to describe, but for another reason. It inherits



THE AMIOT BOMBER: Fuselage and wing in course of construction.



SPOT-WELDING: A Mureaux float being constructed in 18-8 stainless steel with a Sciaky machine.

something from its smaller predecessor, the Breguet "Tout Acier," that quaint machine which carried its tail on the end of what looked like a broomstick. In the "Tout Acier" Breguet used high-tensile steel as the only structural material. The swing back to duralumin has begun, but in the 41M the pendulum has frozen half way. The top plane has two steel spars with vertically ribbed webs and butterfly section flanges. Some of the ribs are duralumin and some steel. The smaller lower plane has a single box spar, of which the rear web is steel and the front of duralumin. The vertical webs are joined by top and bottom surfaces of duralumin. The fuselage is entirely of duralumin, the rear end being a narrow tapering box, a compromise between the slim member of the "Tout Acier" and the conventional form.

The German Way

One of the most impressive exhibits was the Junkers Ju. 52-3m, arranged as a seaplane. The construction of the fuselage and wing is of the corrugated duralumin cover type which has been used by this firm for so many years. Although they were not shown, Junkers have newer methods going through at the Dessau works. The Ju. 60, produced some time ago, had a flat smooth metal covering and they are building the Ju. 160 which is in the same class as the Heinkel He. 70. This also has a flat covering. When higher speeds of the order of 200 m.p.h. are reached, the smooth covering may be worth 10 to 12 miles per hour more.

The exterior of the Heinkel He. 70 makes one suppose that it is covered with a particularly well finished plywood. A glance through the cabin door, however, shows a typical duralumin *monocoque* structure. When the next opportunity presents itself I shall solve this mystery!

The wire-braced fabric-covered biplane persists in some quarters, and a group of very fast offensive military fighters must be mentioned in this connection. The Hawker "Fury" and the Armstrong Whitworth "Scimitar" were the two British representatives, and the Letov 231 and Avia 534 represented Czechoslovakia.

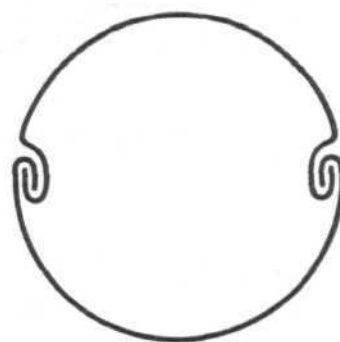
The construction of the two British machines is so well known that it requires no further mention. The "Fury" was completely standard. The "Scimitar" is a development of the earlier Armstrong Whitworth fighters. Some very neat joints and specimens of the A.W. strip structures were shown. A method of making round tube from thin sheet strip was particularly ingenious.

The two half-round strips are drawn together at their beaded edges to form a tube. But in torsion, the beaded joint is liable to open. A narrow copper coated strip is therefore introduced into each joint, and when the tube is heat-treated by the A.W. electrical resistance method the

temperature is sufficient to braze the joint and thus lock it.

On the same stand as the "Scimitar" was a small cousin from the "Avro Trainer" family, one of the few oxy-acetylene welded fuselages in the Salon.

The front and rear ends of the Letov 231 are of welded chrome molybdenum tubing. The centre portion is built of round steel tubes, squared at their ends and jointed with cover plates and tubular rivets rather after the manner of the Hawker structures. The undercarriage is very clean and all that can be seen at first



A.W. double-joint tube.

are two separate legs coming out from the fuselage side. Just inside the covering, however, they turn down again and run to a double hinge at the centre of a floor cross-member. At the top of the crook each leg is fastened to a shock absorber anchored to the bottom longeron. Two almost unnoticeable streamline wires run down from the centre line to each wheel hub. These presumably take the horizontal components of the ground loads.

The fuselage of the Avia 534 is "classique," which means tubular with wire bracing.

This form of construction is of a kind which we know well in England as extremely satisfactory.

Unorthodoxy

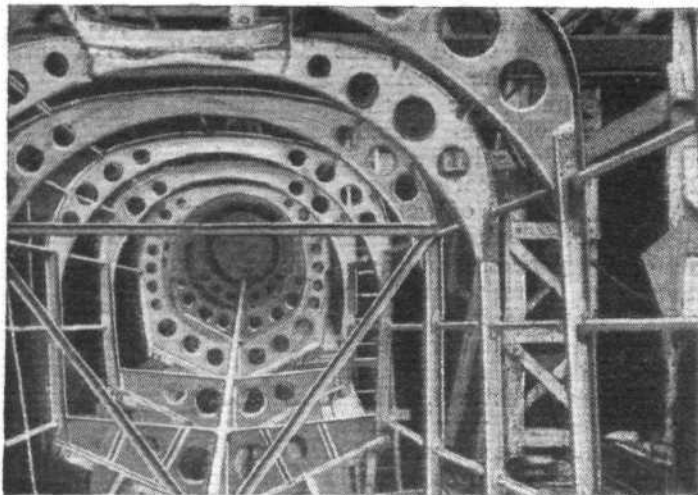
Hanriot has a standard fuselage adapted to three different machines—two trainers and an ambulance. It is of square tubes but cross-braced with strips instead of the more usual wires. These strips are riveted into the joints at each end and have a remarkable tautness. The only feasible way of attaining this would appear to be by putting them in with temporary cross tubes in position, these afterwards being replaced by very slightly longer and permanent struts. Conventions are made to be broken when sufficient reasons arise, but in this case it is apparently just a question of difference. The wing spars are rectangular duralumin tubes and the ribs of three-ply.

Potez has turned back to wooden construction for the fuselage of his big 540 bomber. The wing is fabric covered, but with a simple two-spar structure of duralumin inside.

The big Amiot bomber uses a mixed construction. The main plane is covered with duralumin but the basic structure is tubular. There are three Warren girder spars, built up of tubes, which are braced to each other, also by tubes. The joints are made up by pressings which are riveted together to form rigid sleeve couplings. The metal covering of the wing is clipped on to the spars and longitudinal members.

The forward end of the fuselage and the underslung bomber's gallery is built up from duralumin channel sections. There is a large area of window space, but metal covering is used in between. The shallow rear end is a long metal box built in halves and joined down the centre line. There are four longerons with cross-members dividing the skin into almost square panels. Each panel is divided into twelve or eighteen smaller panels by light stiffeners.

It was too much to expect that the new big flying boats for the South Atlantic air mail service would appear in the Salon. Nevertheless, from the point of view of one brought up with the sea salt in his hair, the flying boat side of the industry was disappointing. The only flying boat was the Lioré et Olivier H. 24. This eight-ton monoplane boat has four engines in tandem pairs mounted on stilts above the centre section. The lines and layout were not unconventional, but the hull structure appeared on closer examination to be somewhat different. In England, if we space the frames widely, we put the stringers close together,



FRENCH BOAT CONSTRUCTION: Internal structure of LeO H.24 hull.

or vice versa. It does not appear to matter which. But in this hull both are widely spaced and the shell plating seems to be uncommonly unsupported.

The twin-tailed Levasseur seaplane is also odd, and can have only military significance. The snub-ended fuselage has a tubular framework covered with ribbed metal sheeting. The two attenuated floats are structurally ordinary but appear to be very narrow-waisted and may not be suitable for open sea work.

The upper works of the Junkers Ju. 52.3-m. has been discussed above, but its floats may be appropriately mentioned here. In England our only experience of the very large twin-float seaplane has not encouraged us in its development. Both the French and Germans have gone further with this type, but their tideless seas, the Mediterranean and the Baltic, may be more encouraging than our wilder waters. The Junkers floats are a "hefty" piece of work, straightforward and solid.

The only other marine flavour was given by the stainless steel-welded floats mentioned at the beginning of this article. It will be very interesting to hear how their very thin plating stands up to the buffeting of rough water.

FIGURES OF MERIT

By R. RODGER

(Continued from page 76)

12.—Typical Data

In Fig. 2 an attempt has been made to compile data relating to figures of merit for a number of the more up-to-date British, American, and Continental civil aeroplanes. The writer considers the use of the word "attempt" to be advisable because the attainment of anything approaching correlative results is almost a heartbreaking task.

The utter disregard for consistency in the presentation of the basic data shown by various authorities is truly remarkable. Sometimes normal power output is quoted, sometimes the maximum. Sometimes the gross weight quoted is the maximum permitted by the C. of A., whilst the performance refers to the aeroplane flying light, and exactly how light is not always mentioned. Tare weight sometimes includes cabin furniture, etc., whilst for another machine these items may be referred to as part of the disposable load. Even the main plane area seems to be a doubtful quantity as one instance arises in which the wing loading is based on main plane area including ailerons and body.

Under these circumstances it is absolutely necessary to accompany Fig. 2 by a commentary to prevent, as far as possible, misapprehension of the results on the part of the reader. In the table alternative values are often quoted and in such cases there is inconsistency in the basic data, the reader being referred to the commentary for the nature of the adjustments made.

13.—Commentary

In compiling Fig. 2, the greatest difficulty of all has been that of assessing the power appropriate to the high speed. The powers given in column 3 are those quoted by the various authorities stated in column 21. In order that the reader may appreciate fully the nature of any differences, Fig. 3 has been prepared giving such data as one can find for the engines concerned.

Airspeed Courier.—There is no consistency whatever between the quoted values for weights, wing area, power, and loadings. Wing area 250 and wing loading 13.5 give gross weight 3,370. Power 240 and power loading 15.7 give gross weight 3,770. Weight empty 2,100 and load 1,690 give gross weight 3,790. The quoted gross weight is 3,900 which, with load 1,690, gives tare weight 2,210.

Stalling speed is quoted. Landing speed has been assessed proportionately lower taking the Envoy as a guide, q.v.

The values for k_{MAX} seem rather high.

Airspeed Envoy.—Two gross weights are quoted—4,900 as performance weight and 5,300 as C. of A. maximum. Wing loading appears to be quoted on maximum weight, and power loading on performance weight and normal power. I have adjusted the loadings to performance weight and maximum power.

Armstrong Atalanta.—Power loading 12.2 appears to be quoted on a maximum power of 470. I have been unable to discover a Jaguar type giving 470 maximum at 4,000ft.—the height at which the top speed is quoted. If maximum power 470 occurs at 4,000ft., the high-speed figure is 18.7. If, however, this power refers to sea level and is not maintained to height, the corresponding high-speed figure is estimated at 21.4.

Avro 642.—Tare weight quoted at 7,360 is exclusive of radio equipment 90, which has been added to give tare weight 7,450.

Power loading quoted at 12.8 appears to be on normal power 460 at 2,000 r.p.m. I have assumed that the engine is a geared Jaguar giving 490 maximum power at 2,200 r.p.m. The power loading has been estimated on this figure.

Stalling speed is quoted. Landing speed has been assessed as for the Courier.

Avro 652.—Power loading quoted at 12.24 is on normal power. On the maximum power 305 the power loading is 10.8. The corresponding wing powers are 1.32 and 1.49, respectively. These adjustments reduce the high-speed figure from 27.6 to 24.4.

Avro Commodore.—From the quoted figures for wing area 307, wing loading 10.82, power 215, and power loading 14.45, the gross weight is returned at 3,320 instead of 3,500 as quoted, reducing the weight ratio from 1.57 to 1.49 and increasing the span loading from .40 to .42. If we accept gross weight at 3,500 and wing area at 307, then the wing loading will increase to 11.4, and the wing power to .74, reducing the high-speed figure to 20.2, and raising k_{MAX} to .89. The corresponding power will be 227.

Blackburn Feeder.—In view of the high value of the weight ratio I suspect that the tare weight quoted at 4,740 is exclusive of equipment, although the Duncanson spar

Nationality.	Maker and Type.	Power Plant.	Truss.	Basic Data.						Speeds. M.P.H.				Figures of Merit.						Source of Basic Data and Speeds.	Remarks. W.F. = Wing Flaps V.P.A. = Variable Pitch Airscrews.
				Weight. lbs.		Loadings.		Spans.		High.		Low.		Weight Ratio.	Speed Range Ratio.	Wing Power.	Span Loading.	High Speed Fig.	K.L. Max. M/c.		
				Gross.	Tare.	Wing lb./sq. ft.	Power. lb./h.p.	Upper. ft. in.	Lower. ft. in.	Speed	Height. ft.	Landing.	Stalling.								
BRITISH.	Airspeed, Courier ...	240 Lynx IVc.		3,900 3,790	2,210 2,100	15.6 15.15	16.25 15.8	47 0	—	162	S.L.	48	55	1.77 1.80	3.38	0.96	.57 .58	30.1 1.29	1.32	Jane's 1933	—
	Airspeed, Envoy ...	2 x Wolsley A.R.9 II 203 at 2,420 r.p.m.		4,900	3,077	14.55	12.18	52 4	—	170	S.L.	55	63	1.59	3.09	1.20	.56	27.8	0.94	Aeroplane 11.7.34	—
	Armstrong, Atalanta ...	4 x 400 Jaguar		23,000	13,600	17.7	12.2	90 0	—	165	4,000	—	—	1.69	—	1.45	.35	18.7 21.4	—	Jane's 1933	—
	Avro, 642 ...	2 x Jaguar VIb 460 at 2,000 r.p.m.		11,790	7,450	16.2	12.04	71 3	—	160	S.L.	56	64	1.58	2.86	1.34	.43	20.8	1.01	Flight 5.4.34	—
	Avro, 652 ...	2 x Cheetah 277 at 2,100 r.p.m.		6,598	4,192	16.1	12.24 10.8	56 6	—	175	S.L.	64	—	1.58	2.74	1.32 1.49	.48	27.6 24.4	0.77	Flight 7.6.34	—
	Avro, Commodore ...	215 Lynx		3,500 3,320	2,225	11.4 10.82	15.45	37 4	37 4	130	S.L.	50	—	1.57 1.49	2.60	0.74 0.70	.40 .42	20.2 21.3	0.89 0.85	Flight 31.5.34	—
	Blackburn, Feeder ...	2 x Rapier VI 305 at 3,500 at 10,000 ft.	LOW WING CANTILEVER MONO	8,600	4,740	18.3	12.3	58 4	—	196	10,000	63	—	1.82	3.11	1.49	.39	25.4	0.90	Flight 7.6.34	—
	Boulton & Paul, P.64 ...	2 x Pegasus I. M2		10,500	6,125	13.9	8.4	54 0	54 0	195	5,000	60	—	1.72	3.25	1.66	.28	26.2	0.76	Flight 6.4.33	—
	Boulton & Paul, Feeder	2 x Jaguar VIA 450 h.p.	DITTO	9,400	6,000	13.1	9.6	54 0	54 0	175	S.L.	62	—	1.57	2.82	1.36	.31	26.8	0.67	Flight 7.6.34	—
	British Klemm, Eagle ...	185/200 Gipsy Six		2,400	1,510	12.0	11.7	39 3	—	170	S.L.	48	—	1.59	3.54	1.03	.64	32.9	1.02	Aeroplane 25.7.34	—
AMERICAN.	De Havilland, 86 ...	4 x Gipsy Six 205 at 2,350 r.p.m.		9,200	5,520 5,950	14.35 15.30	11.2	64 6	64 6	170	S.L.	72 66*	—	1.67 1.55	2.36 2.57	1.28 1.37	.45	26.3 24.4	0.65 0.69	Flight 22.2.34	*Corrected by Capt. Broad.
	De Havilland, 89 ...	2 x Gipsy Six 205 at 2,350 r.p.m.		5,000	2,851 3,102	14.9	12.2	48 0	48 0	165	1,000	—	63	1.75 1.61	2.62	1.22	.46	25.0	0.74	Flight 26.4.34	—
	Airplane Development Corp., Vultee V.I.	Cyclone F.2 700 at 1,900 r.p.m.		7,250	4,275	20.0	10.2	48 0	—	225	3,000	65	—	1.70	3.40	1.96	.32	36.1 34.3	0.92	Flight 22.3.34	R.P. V.P.A.
	Douglas, D.C. I ...	2 x Cyclone 710 at 1,950 at 7,000 ft.		18,000	11,875 12,080	19.2	12.7	85 0	—	210	7,000	61	—	1.52 1.49	3.44	1.51	.40	33.8 32.1	1.01	Flight 1.3.34	R.P.—W.F. & V.P.A.
	Lockheed, Alcor ...	2 x Menasco Buccaneer 230 h.p.		4,710	2,665	16.7	10.2	42 0	—	183	S.L.	57	—	1.77	3.21	1.64	.37	25.4 24.1	1.00	Flight 5.7.34	R.P. V.P.A.
	Lockheed, Altair 8E ...	Wasp S.I.D.I. 550 at 2,200 at 5,000 ft.		5,800	3,297	19.72	10.55	42 9	—	230	5,000	63	—	1.76	3.05	1.87	.32	38.1 36.2	0.97	Flight 16.8.34	R.P.—W.F. & V.P.A.
	Lockheed, Electra ...	2 x Wasp Junior 420 at 2,200 at 5,000 ft.		9,000	5,455	19.64	10.71	55 0	—	221	5,000	63	—	1.65	3.51	1.83	.34	34.6 32.9	0.97	Aeroplane 11.4.34	R.P.—W.F. & V.P.A.
	Lockheed, Orion 9D ...	Wasp S.I.D.I. 550 at 2,200 at 5,000 ft.		5,800	3,640	19.72	10.55	42 9	—	225	5,000	63	—	1.59	3.57	1.87	.32	35.7 33.9	0.97	Flight 16.8.34	R.P.—W.F. & V.P.A.
	Lockheed, Vega ...	Wasp S.C.I. 450 at 2,100 at 6,000 ft.		4,750	2,725	17.02	10.55	41 0	—	195	6,000	60	—	1.74	3.25	1.62	.35	26.0 24.7	0.93	Flight 16.8.34	R.P. V.P.A.
	Northrop, Delta ...	Cyclone SR.1820.F.3 Approx. 700 h.p.		7,000	4,100	19.3	9.86	48 0	—	221	7,700	58	—	1.71	3.81	1.95	.33	29.8 28.3	1.12	Flight 8.2.34	R.P.—W.F. & V.P.A.
	Northrop, Gamma ...	Cyclone SR.1820.F.3 710 at 7,700 ft.	DITTO	7,000	4,000	19.3	9.86	48 0	—	215	7,700	63	—	1.75	3.41	1.95	.33	27.4 26.0	0.95	Jane's 1933	R.P.—W.F. & V.P.A.
	Northrop, Victoria ...	Wasp S.I.D.I. 525 at 5,000 ft.	DITTO	7,000	4,100	19.3	13.6	48 0	—	200	5,000	58	—	1.71	3.45	1.42	.33	33.0 31.4	1.12	Flight 8.2.34	R.P.—W.F. & V.P.A.
	Dornier, Do. F ...	2 x Siemens Jupiter 550 h.p.	MID-WING SEMI-CANTILEVER	17,600	10,500	14.75	16.1	91 10	—	155	S.L.	62	—	1.68	2.50	0.92	.48	27.5 25.0	0.75	Flight 22.2.34	N.P.
	Fokker, F. XX ...	3 x Cyclone R.1820.F.3 712 h.p.		19,840	13,220	19.25	9.25	90 2	—	202	5,900	59	—	1.50	3.43	2.08	.41	25.3 24.0	1.12	Jane's 1933	R.P. W.F.
	Heinkel, H.E.70A ...	B.M.W. VI. 630 h.p.		7,380	5,190 5,410	18.2	11.70 11.53	48 6	—	234	S.L. 7,200	59	—	1.42 1.36	3.97	1.56 1.58	.32	55.8 44.3	1.03	Jane's 1933	W.F.
	Pander, Postjager ...	3 x Whirlwind 420 h.p.		12,100	6,655	25.0	9.6	54 5	—	224	S.L.	60	—	1.82	3.73	2.60	.24	29.1 27.9	1.36	Jane's 1933	R.P. W.F.
	Col. 1 and 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

THE AIRCRAFT ENGINEER

FIG. 3—ENGINE PERFORMANCE

Maker.	Type.	Normal.			Maximum.			Authority.
		H.P.	R.P.M.	Height. ft.	H.P.	R.P.M.	Height. ft.	
Armstrong	Lynx (ungeared)	215	1,900	S.L.	240	2,090	S.L.	Jane's 1933.
Armstrong	Lynx (geared)	215	2,000	S.L.	238	2,200	S.L.	Jane's 1933.
Armstrong	Cheetah V ...	275	2,100	S.L.	305	2,400	S.L.	Jane's 1933.
Armstrong	Jaguar (ungeared)	400	1,700	S.L.	440	1,870	S.L.	Jane's 1933.
Armstrong	Jaguar (geared)	400	2,000	S.L.	490	2,200	S.L.	Jane's 1933.
Bristol	Pegasus I M2 ...	555	2,000	4,500	625	2,300	5,500	Maker.
B.M.W.	Viu ...	500	1,520	Up to 7,200	640	1,650	Up to 7,200	Swan.
De Havilland	Gipsy Six ...	184	2,100	S.L.	205	2,350	S.L.	Flight 22.2.34.
Napier	Rapier II ...	305	3,500	10,000	350	3,900	10,000	Swan.
Pratt & Whitney	Wasp Junior S.B. ...	425	2,200	5,000	445*	2,310	5,000	Jane's 1933.
Pratt & Whitney	Wasp S.C. I ...	450	2,100	6,000	470*	2,200	6,000	Jane's 1933.
Pratt & Whitney	Wasp SI-DI ...	550	2,200	5,000	575*	2,310	5,000	Jane's 1933.
Wolsley	A.R.9 Mk. II	185	2,200	S.L.	203	2,420	S.L.	Aeroplane 11.7.34.
Wright	Whirlwind	420	2,150	S.L.	440*	2,260	S.L.	Jane's 1933.
Wright	Cyclone SR.1820.F2	710	1,900	3,000	745*	2,000	3,000	Jane's 1933.
Wright	Cyclone SR1820.F3	710	1,900	7,000	745*	2,000	7,000	Jane's 1933.

* Estimated at approx. 105% normal.

may be responsible. There is no evidence as to what the tare weight of this machine comprises.

No loadings are quoted. The wing loading 18.3 is based on gross weight 8,600 and wing area 470. The Rapier VI is quoted as giving 305 at 3,500 r.p.m. at 10,000ft. I have no data for the Rapier VI but the performance quoted is the same as the normal performance of the Rapier II given by Swan (see Fig. 3). Taking a risk, I have assumed the maximum performance of the two engines to be the same also, i.e., 350 at 3,900 r.p.m. at 10,000ft., giving a power loading of 12.3.

The top speed is assumed to occur at 10,000ft., the corresponding altitude factor being introduced into the high-speed figure.

Boulton & Paul P.64.—The power loading is on the maximum power 625.

Boulton & Paul Feeder.—On gross weight 9,400 and wing area 717 the wing loading is 13.1 against 12.55 quoted. No power loading is quoted so has been based on the maximum power of the geared Jaguar, i.e., 490 at sea level, which is assumed to be the operational height in the absence of the data to the contrary.

British Klemm Eagle.—Data straightforward. No comment.

D.H.86.—The tare weight quoted at 5,520 is exclusive of wireless equipment 130, lavatory 30, and cabin furniture 270—a total of 430. Adding this item to the quoted tare weight reduced the weight ratio from 1.67 to 1.55.

The wing loading 14.35 is based on main plane area 641 inclusive of body. From the scale drawings in "Flight" the wing area exclusive of body and fillets is estimated at 600, increasing the wing loading to 15.3 and the wing power to 1.37, thus reducing the high-speed figure from 26.3 to 24.4.

It is interesting to note here that in the formula for estimating the handicap speeds in the MacRobertson race the wing area permitted is inclusive of ailerons, but exclusive of fairings and wing surfaces which form part of the top or bottom of the fuselage.

D.H.89.—Main plane area 336, apparently exclusive of body, and wing loading 13.7 give gross weight 4,600, but power 410 and power loading 12.2 give gross weight 5,000, as quoted. On gross weight 5,000 the wing loading is 14.9, which is used in the table. Tare weight quoted at 2,851 leaves a balance of 1,311 for cabin furniture, lavatory, wireless equipment, extra fuel, and pay load. The D.H.86 allows 1,939 as pay load for 10 passengers. The D.H.89 with 6 passengers has been assessed proportionately at $1929 \times .6 = 1,160$, the difference $1,311 - 1,160 = 251$ being added to the tare weight to give 3,102. This reduces the weight ratio from 1.75 to 1.41.

Vultec V.I.—No loadings are quoted. Wing loading 20 is based on gross weight 7,250 and wing area 362. Power loading 10.2 is based on gross weight 7,250 and engine performance 710 at 1,900 at 3,000.

No operational height is stated but the high speed 225 is assumed to occur at the rated height 3,000.

Douglas D.C.I.—Two tare weights are quoted. With 14 passengers 11,875 and with 18 passengers 12,080. No loadings are quoted. Wing loading 19.2 is based on gross weight 18,000 and wing area 940. Power loading 12.7

is based on gross weight 18,000 and engine performance 710 at 1,950 at 7,000, which is assumed to be the operational height in the absence of definite data.

Lockheed Alcor.—I have no data for the Buccaneer so have assumed high speed 183 to occur at sea level.

Lockheed Altair.—No power loading quoted. Power loading 10.55 is based on gross weight 5,800 and engine performance 550 at 2,200 at 5,000, which is assumed to be the operational height in the absence of definite data.

Lockheed Electra.—No comment.

Lockheed Orion and Vega.—Comment similar to the Altair.

Northrop Delta.—No power loading is quoted and the power at 700 approx. High speed is quoted at 8,000ft. Working from the Northrop Gamma with the same engine, power is taken as 710 at 7,700, on which the power loading is based. The operational height is also assumed to be 7,700.

Northrop Victoria.—Disposable load is quoted at 3,400 which is the same as that quoted for the Delta, plus 500 for radio, cabin, and miscellaneous equipment. Hence the weights have been taken as for the Delta. Power loading is quoted at 9.8 which gives power at 714 and appears to be an error. Power loading has been based on power 525. Operational height has been taken at 5,000 in the absence of definite data.

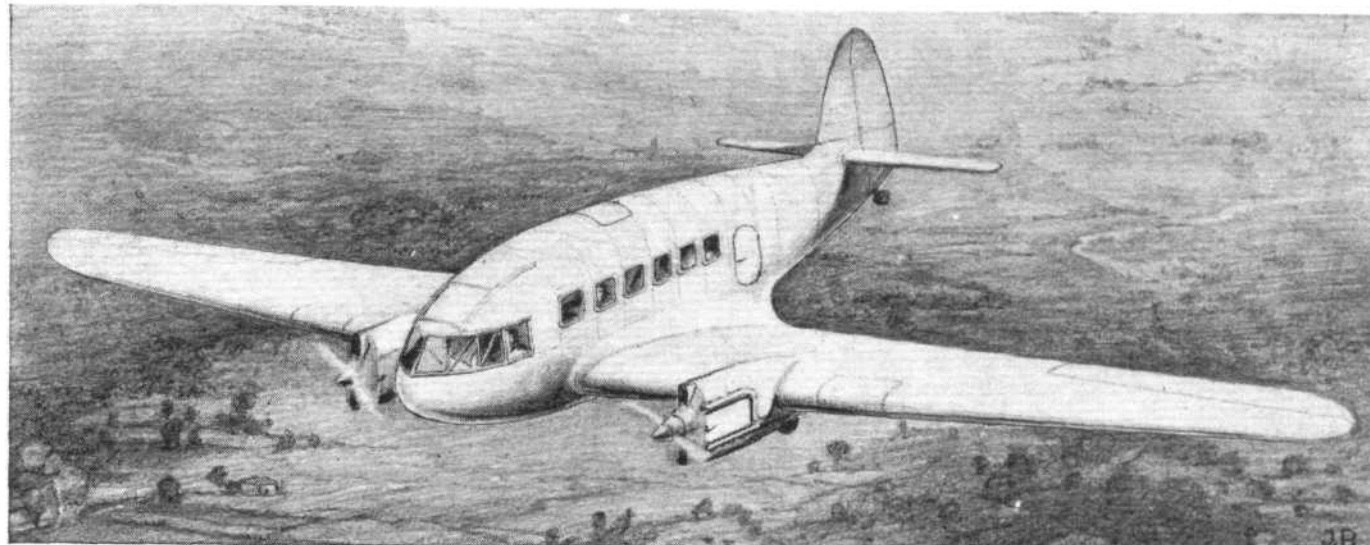
Northrop Gamma.—Tare weight is quoted at 3,500 but in view of the similarity of this machine and the Delta I have added 500 for radio, cabin, and miscellaneous equipment as quoted for the Delta. Operational height has been assumed at 7,700 in the absence of definite data.

General Note on American Machines.—The powers quoted in Col. 3, Fig. 2 for the American engines appear to be those corresponding to the official rated engine speed, and have been listed in Fig. 3 as normal performance. Reference to Section 74 of "Airworthiness Requirements of Air Commerce Regulations for Aircraft" issued by the United States Department of Commerce (Aeronautics Branch) reveals the requirement that airscrews shall be so designed and adjusted that they will limit the engine speed to 105 per cent. of the official rated engine speed at full throttle.

British engines are rated in a rather different manner, both normal and maximum performance being quoted. Taking an average of the data for British engines given in (Concluded on page 1287.)

TO CRUISE AT 175 M.P.H.

The Blackburn H.S.T.10 : A Fast Commercial Monoplane Using the Blackburn-Duncanson Type of Single-spar Wing Construction



Speed without sacrifice of passenger comfort is the chief objective in the design of the H.S.T.10.

It has been known for many months that the Blackburn Company has had under construction something quite out of the ordinary in the way of commercial aircraft, and *Flight* is now able to give an advance description of the machine.

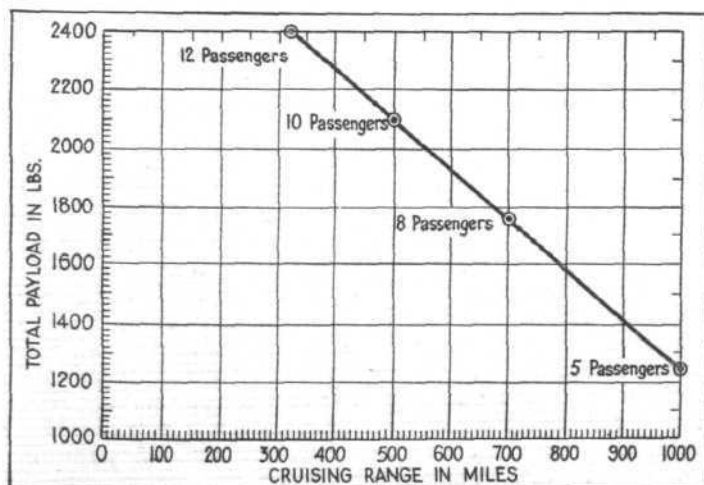
The H.S.T.10, which is the Blackburn works number of the new aeroplane, is a twin-engined low-wing cantilever monoplane of metal construction, employing a Blackburn-Duncanson single-spar wing. Whilst high speed has been considered of first importance, and has been achieved by careful attention to body form, elimination of all unnecessary excrescences, retraction of undercarriage and tail wheel and adoption of novel forms of construction, it is claimed that this object has been attained without sacrifice of comfort and safety of passengers or economy of operation and maintenance.

Intended primarily for passenger transport, the aircraft has accommodation for alternative loads up to a maximum of twelve passengers and two pilots, with a range of 320 miles. For long-distance operation the range may be increased to 1,000 miles with five passengers and two pilots. Alternatively, the cabin space is adaptable to a great variety of purposes, including mail and freight transport, photography and air survey, and ambulance and first-aid work.

Compared with the conventional type of two-spar wing, the Blackburn-Duncanson single-spar structure is claimed to effect a considerable reduction in weight, giving a corresponding increase of payload. It is exceptionally stiff both in torsion and bending, thus obviating risk of flutter. The spar, which is of tubular form, is employed as the fuel tank, thereby saving the weight and space of separate tanks with their mountings. Rigging maintenance is eliminated, and the simplicity of construction, small number of parts, and freedom from structural complication should save time and expense in routine inspection and maintenance. In the event of a forced descent into water the spar should assist towards keeping the aircraft afloat.

Built as a single detachable unit, the wing is of tapered form. The Blackburn-Duncanson spar is constructed in three sections, the central portion constituting the fuel tank, and is of duralumin construction. Girder-type ribs of duralumin tubular sections are employed. The ailerons are both aerodynamically and mass balanced, and their control mechanism is enclosed completely within the wing. Hydraulically operated trailing-edge flaps are provided.

A cantilever monoplane tail plane of duralumin construction is employed; it has interconnected elevators, aerodynamically and mass balanced, and is fitted with an



Ranges of the Blackburn H.S.T.10 with various payloads.

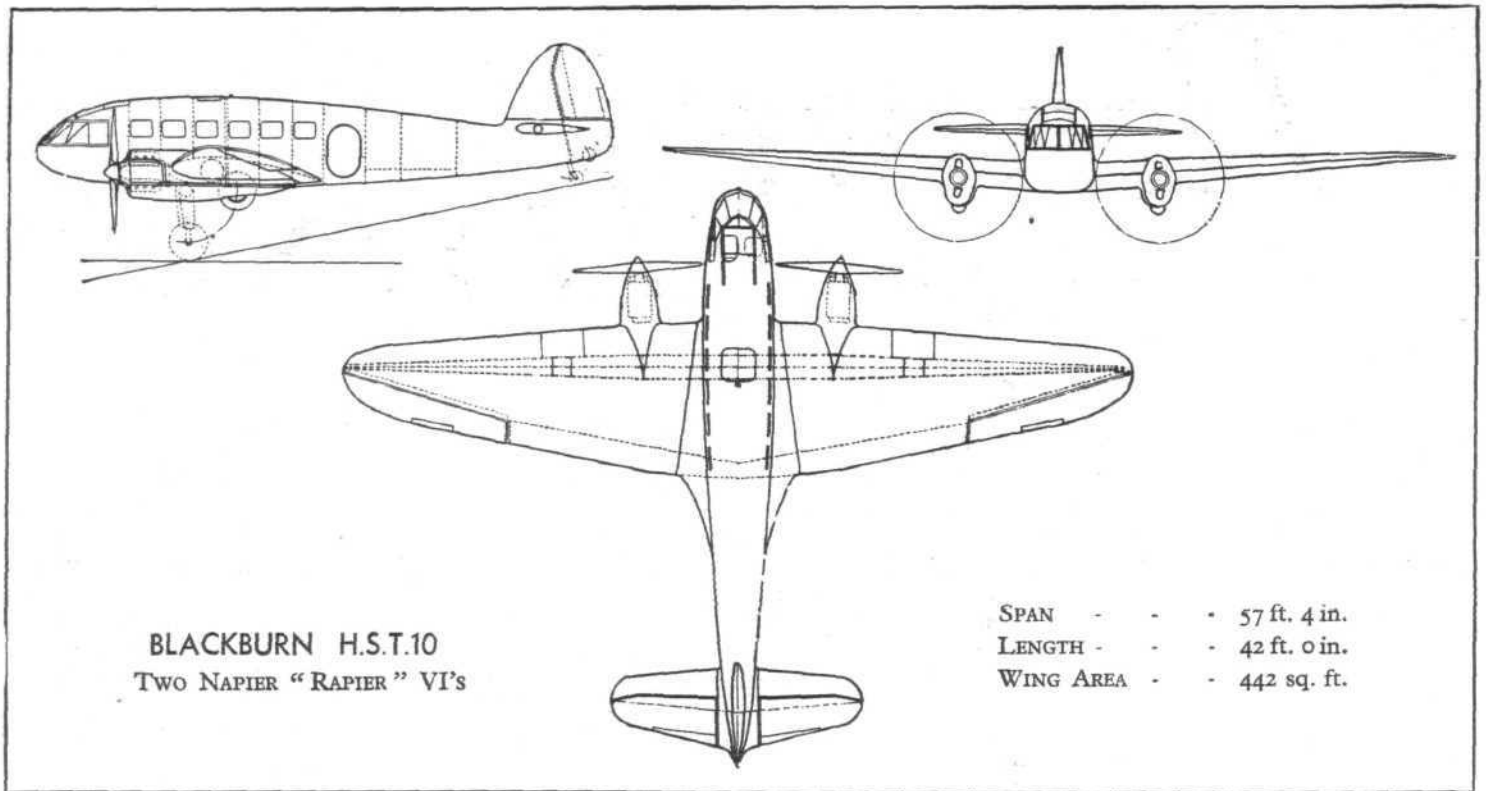
BLACKBURN H.S.T.10. HIGH-SPEED COMMERCIAL MONOPLANE TWO NAPIER "RAPIER" VI'S

DIMENSIONS	
Span	57ft. 4in. (17.5 m)
Length	42ft. (12.8 m)
Height	12ft. (3.6 m)
Wing area	442 sq. ft. (41 m ²)
Track	15ft. (4.57 m)
Length of cabin	18ft. (5.5 m)
Width of cabin (average)	4ft. 4in. (1.3 m)
Height of cabin (average)	5ft. 6in. (1.67 m)
Passenger cabin capacity	352 cubic ft. (10 m ³)
Luggage compartment capacity	37 cubic ft. (1.05 m ³)

WEIGHTS	
Tare weight (with crew of 2)	5,520 lb. (2,510 kg)
Gross weight	8,600 lb. (3,904 kg)

(See graph for various payloads)

PERFORMANCE	
Maximum speed at 5,500ft. (1,677 m)	204 m.p.h. (328 km/hr)
Cruising speed... ..	175 m.p.h. (282 km/hr)
Landing speed	63 m.p.h. (101 km/hr)
Initial rate of climb	1,000 ft./min. (5.08 m/min)
Service ceiling... ..	23,800ft. (7,259 m)
Ceiling on one engine... ..	5,000 ft. (1,525 m)



easily adjustable trimming device. The fin and rudder are of conventional design and constructed of duralumin, the rudder having a back-set hinge type of balance.

Monocoque-type construction is used for the fuselage, which consists of transverse frames, longitudinal stringers and shell plating of Alclad. The clean lines of the fuselage may be seen in the general arrangement drawings, which show also that the attachments of the wing, tail plane and fin are well filleted to eliminate interference. In the extreme nose of the fuselage is the pilots' cockpit, which accommodates two pilots placed side by side with adjustable seats. A transparent sliding roof and sliding side windows are provided for the cockpit, the top sliding panel being fitted with a sun blind.

The passenger cabin is separated from the pilots' compartment by a partition with a communicating door. It is

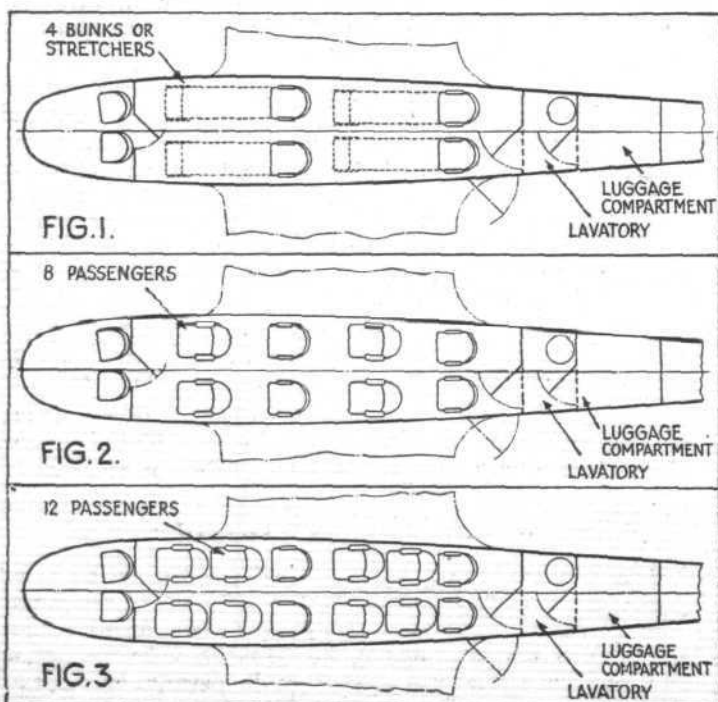
18ft. long, 4ft. 4in. wide, and has an average height of 5ft. 6in., giving a capacity of 352 cubic feet. The seats are arranged in pairs facing forward with a central gangway and collapsible tables, light luggage racks being provided for the convenience of passengers. Noise and variations of temperature are reduced by the insulation of the cabin walls. Ventilating and heating systems are installed, with separate ventilation controls for each passenger, and there are side windows of ample proportions. A door gives access to the rear of the cabin on the port side. Behind the passenger cabin is a lavatory with a capacity of 33 cubic feet, and further aft is the luggage compartment, which is 37 cubic feet in capacity.

A Retractable Tail Wheel

As stated previously, a retractile undercarriage is fitted, this consisting of two separate units, one beneath each engine nacelle. Medium-pressure air wheels are employed, and are provided with Blackburn oleo-pneumatic struts. The retracting mechanism is operated hydraulically and is protected from mud by covers which can be removed for inspection. A large indicator showing the position of the undercarriage is mounted conspicuously on the pilots' instrument board, and an automatically engaged warning device assists in preventing the pilot from attempting to land with the wheels in the retracted position. Independently operated wheel brakes are fitted as standard. The tail wheel is also retractile, and is of the free castor type sprung by an oleo-pneumatic strut; the wheel is of the low-pressure type.

A central column with a "spectacle"-type handle (which may be swung over to the seat of either pilot) and two parallel-action adjustable rudder bars form the flying controls. Longitudinal and directional trimming gear is also provided, the latter being adequate to prevent yaw with one engine stopped. The flap control is placed between the pilots' seats.

Two Napier "Rapiér" VI moderately supercharged sixteen-cylinder "H"-type air-cooled engines are carried on steel tubular mountings on the wing spar; they drive two-bladed airscrews. These engines are enclosed in nacelles faired into the wing and fitted with detachable cowling. The whole of the engine installation and petrol and oil systems are fully accessible for maintenance, and replacement of an engine is easily effected.



Some alternative seating arrangements provided for in the design of the Blackburn H.S.T.10.

PRIVATE FLYING

A SECTION FOR OWNER-PILOTS
AND CLUB MEMBERS

AS a nation we are prone to self-deprecation, and this is particularly true with regard to our military air strength. It is no prerogative of this page to deal with the strength of our air forces, or we might have to admit that it is no mere expression of modesty when we lament the paucity of our protective aircraft. It will be more satisfactory, as well as more appropriate, to enquire into our relative position from the point of view of civil aviation and particularly private flying.

An analytical review of the progress of private flying throughout Europe is not possible in a short article, so that I will confine myself to a few comparisons with regard to countries with which I am more familiar. Published statistics often leave us to infer the position of private flying and do not isolate it clearly.

For the purpose of this article I will compare the approximate number of pilots' licences and machines registered. As far as this country is concerned, the figures given are those up to September 30, 1934. On this date the number of pilots' "A" licences issued was 2,920, and "B" licences 510. The comparable figures for France, which, in common with those of the other countries mentioned, are taken as at December 31, 1933, are 3,240 "touring pilots'" licences, and 1,200 commercial air transport licences. The various air licences in Germany, being considerably sub-divided, are given in one figure as 3,788. The ratio of commercial to private pilots in Italy and Belgium is high, those for the former being 500 commercial and 768 private, and for the latter 219 and 361 respectively.

Pilots in Three Countries

FROM this it will be seen that the total numbers of registered pilots given are: Great Britain 3,430, France 4,440, and Germany 3,780. While the number of commercial pilots in France and Germany considerably exceed those of Great Britain, there appears to be no great disparity between the number of private flying personnel of the three countries. When one comes to compare the number of civil aircraft in the same way, the position would seem to be much the same. In this case the comparison is based on the figures as at September 30, 1934, for the total machines registered, less those indicating commercial aircraft (the number of air transport machines is given separately).

The civil aircraft are: United Kingdom 1,160; France 1,670; Germany 1,150; Italy 380; and Belgium 130. Air transport machines are: United Kingdom 100; France 180; Germany 190; Italy 70; and Belgium 40. As far as commercial air transport is concerned we compare less favourably, there being little to choose in this respect between France and Germany. If we take the total number of civil machines, the position reveals: France 1,850; Germany 1,340; and the United Kingdom 1,260. From the figures available it is not possible closely to analyse the number of aircraft actually used for private and club flying, as the total other than air transport machines in-

cludes those used for miscellaneous purposes, such as air taxi and charter work and for school training.

It would be interesting to analyse the extent to which Government support has a bearing on the number of machines possessed by the various countries. Of those referred to, France comes a good first, and the French method of encouraging private ownership is worth mentioning. In 1930 the French Government inaugurated a scheme designed to foster civil aviation, whereby private purchasers of aircraft and flying clubs received a bonus amounting to as much as one-third of the purchase price of machines. In addition, a maintenance grant was given but this was discontinued in 1932.

The purchase bonus is still in vogue, but during the last two years the necessity for economy has resulted in the grant being decreased by fifteen to twenty per cent. As might be expected, preference was given to machines built in the country, although a reduced bonus is given for imported aircraft. The grant itself varies according to the horsepower and seating capacity of the machine, and an extra bonus is given to encourage the use of parachutes. A small grant is also given when the pilot takes his first certificate.

The total purchase subsidy amounted in 1931-32 to as much as 20,000,000 frs. (£161,100), the figure for 1933 being 9,000,000 frs. (£62,390). The bonus is applied for by the purchaser who receives the benefit, but in practice it is actually paid to the manufacturer. This system undoubtedly encourages the building of private aircraft and is reflected in the greater number of such machines in France.

The British method of subsidising private flying, which was continued for a further three years after the expiry of the agreement with the flying clubs in March, 1933, takes the form of a lump sum payment of £300 to an approved club, together with a bonus of £20 for each pilot trained to "A" licence standard, with a further grant of £10 in respect of each flying member who renews his licence—he having completed the required flying time on the club aircraft.

It is not possible to indicate to what extent private flying in Germany is assisted by the Government, as this is regulated by the provisions of the Versailles Treaty. Whilst a direct financial subsidy is not in order under these restrictions, encouragement of this branch of aviation, by way of making available various facilities, is apparently not prohibited.

Issuing Licences Abroad

THE methods of issuing pilots' licences are worth comment. That in France is rather different to our own, in that the private licence is issued in two forms. One limits the holder to piloting an aircraft with no other person on board, and the second grade permits the carrying of passengers, who must not, of course, be flown for direct or indirect remuneration.

The German system is much more elaborate. The

NOTES

by

LORD SEMPILL

A.F.C., F.R.Ae.S.

Private Flying

licences are divided into three classes, each sub-divided into two categories, and are issued in accordance with the loaded weight of the machine to be flown. There is, therefore, no clear demarcation between a private and commercial certificate.

The licences are, however, issued in accordance with the

experience of the pilot. The "B" certificates call for tests in night flying, and a certain minimum mileage must have been flown on the type of machine in the preceding category. The "C" licences demand a knowledge of wireless telegraphy and of meteorology, and the candidate must have all-round technical capacity.

FROM THE CLUBS

Events and Activity at the Clubs and Schools

CARDIFF

Fog and bad weather prevented flying on two days of the past week, during which 7 hr. 15 min. were flown. Mr. Measures went solo after 4 hr. 15 min. dual instruction.

HATFIELD

Owing to the fog which has been prevalent over the South of England during the past week the flying time at the London Aeroplane Club dropped to 23 hr. 55 min.

During a cross-country flight to Newcastle, P/O D. A. Letts, of the R.A.F. Flying Club, was held up at Waddington by weather conditions.

NORFOLK AND NORWICH

Again the fog did its best to interfere with the week's flying at Norwich, but members made the most of the few fine periods, and during the week-end a few hours were put in by the more experienced pilots. On Tuesday Mr. Ken Waller landed at Norwich. He has been a constant visitor to the club.

The next supper-dance is fixed for Friday, December 14.

CAMBRIDGE

Flying times for the week at Marshall's School were 12 hr. 50 min. dual and 10 hr. 50 min. solo. Foggy weather had made a reduction in the week's total of flying hours, which steadily, however, maintains an above-the-seasonal average. One new member, Miss Owen, joined the school.

Six members of the Civil Flying Corps took instruction on Sunday, November 18, and managed 4½ hours' flying.

READING

The foggy conditions of the past week have, of course, somewhat interfered with flying, but, being able to live on the aerodrome, pupils have taken every advantage of the fine weather there has been.

Mr. Gran Herricksen has arrived from Norway. He, in company with Messrs. Walter and Bernhoft, are shortly flying a three-seater "Hawk Major" to Norway.

Mr. A. Reedtz, of Denmark, has joined the school, and he, also, is taking delivery of a "Hawk."

NORTHAMPTONSHIRE

Although the weather was very poor during last week, Sywell aerodrome continues to show activity, and Mr. A. H. Simpson made his first solo. The annual ball of the Aero Club was well patronised by club members.

An air taxi service is now available at Sywell, and is being run by Midland Airways, Ltd.

On Sunday evening a cinematograph show was given in the clubhouse, and films were shown of various members' travels and of Sywell in the past.

LANCASHIRE

In this month's bulletin the Lancashire Aero Club gives some interesting comparative figures proving that the initially higher flying cost for a machine with a good performance—in this case the Avro "Cadet"—is often repaid in the case of all flying other than mere "aerodrome circling." Its faster climb and higher speed balance the lower running costs of a lower-powered machine.

The Parnall Trophy has been awarded to Mr. Colin Wilson for his work as honorary instructor to the club.

Four first solos have so far been carried out on the new C.30 Autogiro, which has been kept very busy.

MASONIC

The Masonic Country and Flying Club held a dinner and dance at their clubhouse, "Julian Hill," Weybridge, on Saturday, November 17, to commemorate the club's first "A" licence. W. Bro. Geo. Kenyon, P.M. Ember Manor Lodge No. 4740, who presided, was the member who has so successfully passed his tests.

A large gathering of members and their friends sat down to dinner, the honoured guest being Mr. Ken Waller, who was supported by Capt. and Mrs. Duncan Davis, Capt. Mackenzie, Mr. and Miss Geo. Lowdell, and Mr. Massey from Brooklands.

After the dinner the evening was devoted to a carnival dance.

HANWORTH

On no fewer than five days last week Hanworth was completely shut in by the fog, but the club managed to complete 24½ hours of flying on the remaining two days.

Members are reminded that the next dinner-dance is on Saturday, December 1.

HERTS AND ESSEX

Heavy fog prevented flying on four days, but in spite of this handicap two first solos went off—J. K. Ariowitsch and H. J. Bacon. The flying time totalled 28 hours, and one new member joined the club. The Woodside Cup Competition should be held on December 2.

YORKSHIRE

Three new members joined the Yorkshire Aeroplane Club last week, during which fifteen hours were flown and a cross-country trip made to Doncaster.

The new directors of the club are: Messrs. G. H. Aykroyd (chairman), R. H. Braime, T. R. Micklethwaite, and G. C. P. Way.

BRISTOL AND WESSEX

Lady Blanche Douglas, who is flying to India in her Miles "Hawk" with F/O C. V. Ogden, cleared Customs at Bristol Airport on the morning of November 20 at 9.30 a.m., and arrived at Abbeville the same morning. They had hoped to reach Lyons, but were forced down by fog. On the Friday before her departure Lady Blanche Douglas gave a farewell dinner to her friends of the club.

NORTH STAFFORDSHIRE

The club's second annual ball was held at the Crown Hotel, Stone, on November 16, and proved highly successful, nearly 150 persons being present, including parties from Stafford, Birmingham, and North Wales. In the course of a short speech Dr. C. S. Glass, the president, remarked, "I took up flying when I was told every cloud had a silver lining. As a good Aberdonian I thought I would go up and see for myself!"

CINQUE PORTS

The weather last week was most unkind, the aerodrome being besieged by air liners unable to get to Croydon. The total dual and solo was only 21 hours. However, the club managed to work in two first solos by Messrs. H. Sowerbutts and R. J. de Brett, and both Miss C. Lemar and Mr. H. Cheeseman passed their "A" licence tests.

On Sunday the Granville monoplane, flown in the Australia Race, landed at Lympe.

SOUTHERN

In spite of extremely poor visibility club machines flew eleven hours last week. One new member joined. An Air Service Training "Puss Moth," flown by an Austrian pupil, was forced to land on the downs to the north-east of the aerodrome at the beginning of the week. The machine was still there on Sunday, waiting for a stiff breeze to help get it out of a very restricted area. A humorous coincidence arises out of the names of the pilot and the policeman who arrived on the scene shortly afterwards. The former was Mr. Hell and the latter P.C. Heaven.

BROOKLANDS

The new members last week included Miss Malcolm, who has done a good deal of flying in Vienna, but preferred to work for her "A" licence under English tuition. Miss Oakley and Mr. Graves did first solo flights.

Captain Davis, Mr. Scholes, of Shell-Mex, and Mr. E. Goldsmith braved the fog on November 16 and motored up to Northampton for the annual dinner and dance. Captain Davis returned in time to attend the dinner and dance given by the Masonic Country and Flying Club to celebrate the opening of their new "flying" Lodge. Captain Mackenzie, the chief instructor, has gone to Brough for his Reserve training.

The repair section has been busy completing a new metal "Moth" to add to the fleet of instructional machines.

The very bad fogs experienced during the past week have lowered the flying times to a total of 51.10 hours

COMMERCIAL AVIATION

— AIRLINES — AIRPORTS —

CROYDON

Loud Speakers : During the Fog : Interesting Passenger Lists : Olley "Specials"

IT is curious that I should have mentioned the need for loud speakers in the main hall, for the Air Ministry has this matter well in hand, and a loud speaker system, whereby passengers can be called when machines are ready to depart or when coaches are leaving for London, will be in working order within a week or so. One of the three loud speakers to be used will be in the buffet, and the microphone will be so placed as to afford little temptation to practical jokers and small boys.

Despite considerable difficulty, remarkable results were achieved in operating services to and from the Continent during the fog. On one day last week, for example, all the K.L.M. services were run though only one of them used Croydon—the early morning departure. The inward morning machine landed at Biggin Hill, the midday service was operated thence, and the inward afternoon machine landed at Lympne. The point is that all passengers, goods and mails reached their destinations—which is better than being fog-bound on a boat in the Thames for three days and nights.

Both Biggin Hill and Lympne have had machines of five nationalities seeking refuge with them during the past week. Lympne, under Capt. Markam, has lived up to its ancient tradition of efficient and cheerful service, and pilots of all nationalities are loud in their praise of the courtesy and hospitality displayed at Biggin Hill. It seems to me very noble of the officers there to entertain a mixed bunch of passengers in the mess. I am told some of the passengers were somewhat astonishing in their behaviour.

It is to be noted, not without a smile, that some of the much vaunted airports which are said to be free from fog when Croydon is not, have not been available during the last spell of really bad weather. Croydon is not ideal, but if slashing attacks are to be made on it in the daily papers, the writers should at least get their facts right. One such effort spoke of Croydon as having "sprung into notoriety a few years back when part of the field collapsed under a taxiing airliner, disclosing an underground stream." Now that happened at Hanworth, which is near enough, perhaps, for a newspaper

story. The next item was somewhat exaggerated praise for our neon beacon which was said to be visible twenty-five miles away in fog.

A number of interesting passengers came in during the week. One Imperial Airways' machine had on board Princess Helen of Roumania and Princess Irene of Greece, who were met by Prince Paul of Yugoslavia. On the same aeroplane were Princess Mdivani and Sir Philip Sassoon. By the Scandinavian Air Express of K.L.M.-A.B.A. came Prince Carl of Sweden. On another K.L.M. machine was the first through passenger from Melbourne to Croydon, Lady Moulden, who flew back as far as Amsterdam by the Douglas, and who stated that the whole trip was delightful, and that the aeroplane was extremely comfortable.

On the freight side, items worthy of mention were some films from Australia via K.L.M., consigned to the Vauxhall Motor Co., and cleared through customs with despatch by Lep Transport, Ltd., and another parcel, by K.L.M. Batavia-Amsterdam line, consisting of fresh flowers from Athens consigned to Princess Marina and delivered to Buckingham Palace.

Olley Air Service, Ltd., have had both shooting and yachting specials during the week—a machine-load of sportsmen in Harris tweeds with gun cases for Wales, and two separate charters for Southampton and Portsmouth, with yachtsmen wishing to inspect their yachts refitting for sea.

A special ambulance machine was also ordered from the same company to carry an invalid with a dislocated neck, the idea being to obtain freedom from the jolting inseparable from other forms of transport.

While referring to the late Capt. Prendergast last week, omission of a word caused my remark to appear, to say the least of it, rather ambiguous. Actually, of course, the sentence should have read: "Although Capt. A. R. Prendergast . . . had spent most of his service with Imperial Airways abroad . . ."

I hear that all the Imperial senior pilots have now completed the blind flying course at Hamble, which is universally acknowledged to be of the utmost value. A. VIATOR.

North Atlantic Airship Service

Since his return from the United States, Dr. Eckener has stated that an agreement has been reached with the Government whereby the new L.Z. 129, on its completion next year, will be used on an experimental service between Germany and Lakehurst, or, perhaps, Miami. It is calculated that the new ship will make the crossing either way in 48 to 55 hours.

Empire Services Duplicated

It has been decided that the Empire services from London to Calcutta and to Johannesburg shall be duplicated. This will give a twice-weekly service for both mail and passengers in both directions between Britain and Palestine, Iraq, the Persian Gulf, India, Sudan, Uganda, Kenya, Tanganyika, North and South Rhodesia, and the Union of South Africa, and four return services a week between Britain and Egypt. The daily stages will be identical to those on the present services.

The first duplicate service from London to Johannesburg will leave Croydon on Sunday, December 30, with departures each Sunday and Wednesday thereafter. The first to Calcutta will leave Croydon on Tuesday, January 1, 1935, subsequent departures being on Tuesdays and Saturdays.

In the reverse direction the commencing dates are: From Calcutta, Saturday, January 5, 1935; and from Johannesburg, Saturday, January 5, 1935.

Portuguese Air Mails

A contract between the Posts and Telegraphs Department and the Aero-Portuguesa Limitada, for the carriage of air mail matter between Portugal and Morocco—and thence to and from South America—was signed in Lisbon on November 8.

The Aero-Portuguesa Ltda. undertakes to provide one service between Lisbon and Tangiers weekly, on Saturdays to Tangiers and on Sundays back to Lisbon. The service is to be run in such a manner that connections between the Portuguese aircraft and the southbound Air France machines shall be ensured. The company made a deposit of Esc.20,000,000 (about £180 at the present exchange) as a guarantee that it was contracting in good faith.

The contract is to last one year, and at the expiration it may be renewed if the Government so wishes. By giving thirty days' notice either party may bring an end to the contract. The Posts and Telegraphs Department guarantees to utilise the Company's facilities for all mail matter destined by senders to travel by air. It reserves the right to use in case of necessity or convenience any other aerial services which may, in the future, be established in Portugal. Otherwise, the contract is a trifle one-sided. The contract may be cancelled, for instance, should four consecutive trips fail to be run. Since October 20 the Lisbon-Tangiers service has worked without mishap.

One can but commend the French for their foresight in getting well in, and it is perhaps a pity that British capital has not been sufficiently interested in Portugal.

HERE AND THERE

Viceroy's Cup Race Cancelled

A sparsity of entries has resulted in this year's race for the Viceroy of India's challenge trophy being cancelled.

New Customs Aerodromes

Both Newtownards (Ards) and Renfrew have been approved as Customs aerodromes. Facilities are not continuously available at either airport, so prior notification should be made, if possible.

Westland Autogiros

In addition to the large five-passenger Siddeley-engined Autogiro being constructed to the order of the Air Ministry by the Westland Aircraft Works, this Company is also building, as a private venture, a two-seater side-by-side Autogiro with a Pobjoy "Niagara" engine. It is understood that this machine will be rather similar to the Lepère machine shown at the Paris Show in 1932.

For the South Atlantic Service

The new Latécoère flying boat which is being built for the South Atlantic services of Air France has been completed at the works at Toulouse. Fitted with six Hispano engines of 850 h.p. each, it is estimated that the machine will have a range of 4,500 km. (2,800 miles) for a total loaded weight of 37,000 kg. (81,400 lb.). The estimated cruising speed is 230 km/h. (143 m.p.h.). The machine has a span of 50 m. (164 ft.), and it has been named after the late Lieut. Paris, of the French Navy.

Hamble Traffic Restrictions

Owing to aircraft flying near Hamble Aerodrome disturbing the peace of Netley Hospital, it has been found necessary, *vide* an Air Ministry notice to airmen, No. 104 of 1934, to order a partial suspension of air traffic in the vicinity. A red square panel will, therefore, be displayed close to the wind tee at the southern end of the aerodrome.

The ordering of left- or right-handed circuits will be indicated by the letter "L" or "R" exhibited alongside the panel. Left-handed circuits are always in force at Hamble Seaplane Station, and aircraft should avoid flying over Southampton Water in a contrary direction to this circuit.

An Irrawaddy Air Service

The Irrawaddy Flotilla Company, Ltd., is to open a seaplane service between Rangoon and the Yenangyang oil area. Imperial Airways will be responsible for the technical side of this service, with Capt. W. H. Philip in charge of the flying operations, and a seaplane hangar at Rangoon is almost completed.

A D.H. "Puss Moth" with floats is to be used, and a trial flight will be made before the actual inauguration of the service.

The Irrawaddy Flotilla Co., of course, have been in river transport for the past seventy years, and their entry into air operation is a sign of the times.

A Taste of the Worst

The virtually impossible conditions prevailing during the first three days last week were not quite as disturbing to the airline operators as to some of the shipping companies.

Croydon's denizens were more or less earthbound, but among the internal services Jersey Airways flew machines from Portsmouth to Jersey on Monday and Tuesday, but were completely defeated on the third day. Three of their "Dragons," incidentally, are now fitted with two-way wireless, and two of the fully equipped "86s" will be delivered in January.

Provincial Airways ran daily through to Plymouth, using Kenley aerodrome, which was above the fog, as a base. P.A.'s traffic manager was lucky in knowing the C.O., and permission appears to have been obtained without much difficulty. Essex Airport, too, was outside the worst, and Mr. Hillman's Paris service was run every day. Railway Air Services connected Glasgow, Belfast, and Liverpool, but were beaten in the southern area.

A very fair show, considering that those three days were typical of the worst that can be expected.

A Newtownards Warning

Pilots are advised not to attempt to land at Newtownards without prior consultation with the manager (Tel.: Newtownards 190), as drainage operations are in progress.

New Beacon at Cape Town

A new light, the third most powerful in South Africa, has been established at Wingfield Aerodrome, Cape Town. It is of 1,530,000 c.p. and shows a white flash every three seconds.

By Air Over Italy

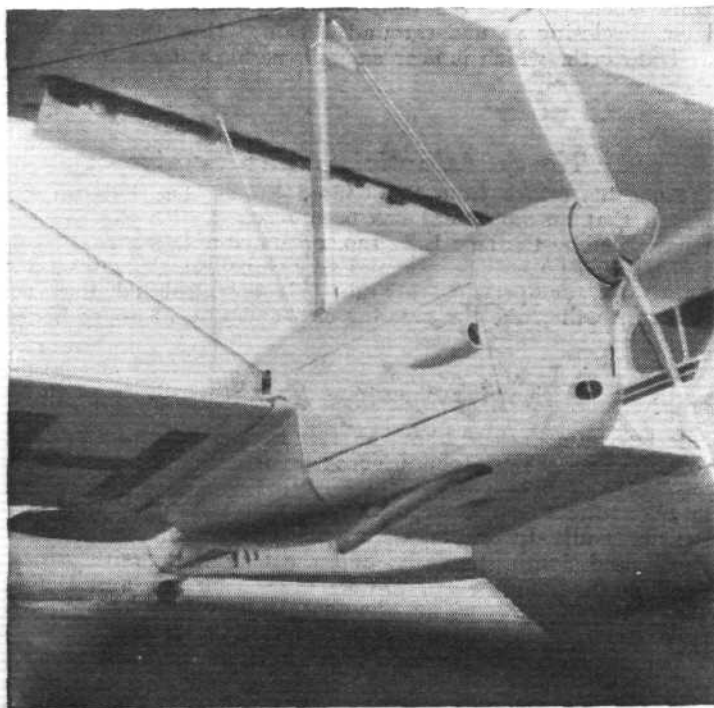
A little book, produced by the Italian State Tourist Department, and called "Italy Seen from the Sky," is worth examination if only because of the high standard of the photogravure aerial views of the principal Italian cities and parts of interest. The casual reader, too, will be surprised to discover the way in which the Italian air lines, over sea and land, have extended during the past few years. To-day it is possible to fly on Italian lines to most of the more important places in the country itself, and also to such points as Algiers, near Gibraltar—*via* Marseilles and Barcelona—Tunis, Tripoli, Tobruk, Athens, Salonica, Constantinople and Rhodes.

Copies of this book may be obtained gratis from the Department at 16, Waterloo Place, Regent Street, S.W.1.

From Prague to Amsterdam

The summer air service between Prague and Amsterdam, *via* Leipzig and Rotterdam, with a connection to London, was discontinued after October 15. The number of passengers carried during the season was 3,996, compared with 3,012 in 1933, and the distance flown totalled 625,208 miles, compared with 468,651 miles during 1933. There was thus an increase of over 32 per cent. in the traffic and more than 34 per cent. in the distance flown. The air mail conveyed totalled 17,455 lb., as against 7,840 lb. last year, an increase of over 120 per cent.

Conducted by the Czechoslovak Air Lines with their triple-engined Fokkers, the service showed a regularity of 99.7 per cent. On the last day of the season a record flight was made, the distance between Amsterdam and Prague, which is 550 miles, being covered in 3 hours 15 minutes, an average speed of 171 miles an hour.



FLAPS FOR THE "EXPRESS": The D.H. 86 machines which are being delivered to Jersey Airways next year will be fitted with split flaps on the upper wing.

CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

"FREAKS AND THE FUTURE"

[2980] While reading through your very excellent Paris Aero Show report I came upon one statement on which I should like to comment.

You say that there was not a single "freak" in the Show, and qualify the statement by remarking that all the exhibits have either been flown or "have reasonable prospects of flying fairly well."

Now, no normal—and by "normal" I mean "normally conservative"—person would have imagined in 1919 that Señor Cierva's queer device stood an earthly chance of flying, yet to-day it flies well and, many hope will, in time, alter our ideas of what a flying machine should be and do.

When shows cease to produce "freaks" the industry concerned has ceased to produce brains. It will be a dull day when our designers lean back in their comfortable chairs and remark to all and sundry that the whimsical affair known to-day as "an aeroplane" represents the final development in aeronautics. We have not even recovered from the devastating effect of a war in which all was sacrificed to performance. The conventional light aeroplane of to-day is little superior in performance and manners to the B.E.2 of 1913.

London, W.8.

B. S. H.

THAT MAIL CONTRACT

[2981] After all the panic-stricken articles that have appeared at one time or another in various daily papers, and—*mirabile dictu*—in our earnest technical papers, concerning the railway "octopus," it was comforting to read last week that Mr. Hillman's concern had obtained the mail contract to Belfast and Glasgow.

With all their resources (*sic*) Railway Air Services could surely have undercut Mr. Hillman had they been filled with an abominable determination to override allcomers, drive them into the bankruptcy court, and then drop the whole affair. One can hardly blame R.A.S. for examining a map of the British Isles and carefully considering those routes from which a small dividend might be squeezed. The ruling principle of our precious system is based on a garbled version of Mr. Darwin's "Origin of Species"—this version having been invented before the birth of Mr. Darwin himself.

The fact is that even the railways have their shareholders to consider, and to incur a heavy loss simply for the sake of saving a few hundred first-class passengers for their iron horses would be a difficult policy to explain. Mankind, in any case, has a pathetic little way of considering this year's income and entirely disregarding that of the year ahead.

Gravesend, Kent.

UNCLE REMUS.

FIGURES OF MERIT

(Continued from page 1280h)

Fig. 3 it will be found that both maximum power and maximum r.p.m. are approximately 110 per cent. of normal.

Taking the rated powers of the American engines in estimating the figures of merit may, consequently, be assumed with some justification to under-rate the wing powers and correspondingly over-rate the high-speed figures.

Assuming the maximum engine performance to be, on the average, say 5 per cent. above normal, the power loadings will be reduced and the wing powers increased, thereby decreasing the values of the high-speed figures as shown in Fig. 3.

Dornier Do.F.—Power quoted is assumed to be normal and as no operational height is mentioned, the performance is assumed to refer to sea level. The value of the high-speed figure has been modified to apply to maximum power equivalent to 100 per cent. normal.

Fokker F.20.—Weight empty quoted at 12,120 excludes 1,100 for equipment. The two items have been added to give tare weight 13,220. High speed is quoted at 5,900 and engine performance at 7,700 as for the Northrop "Gamma." The altitude-power factor applied to the high-speed figure is

$$\frac{1}{2} \left(\frac{P}{P_0} + \sigma \right)_{7700} \div \frac{1}{2} \left(\frac{P}{P_0} + \sigma \right)_{5900} = 0.94.$$

Heinkel H.E.70A.—Weight empty is quoted at 5,190 including cabin furniture, wireless and full blind-flying equipment. Load is quote at 1,970 comprising crew 352, fuel 738, and pay load 880. Subtracting this item from the quoted weight loaded 7,380 gives a tare weight of 5,410, reducing the weight ratio from 1.42 to 1.36.

I cannot obtain any consistency whatever in the loadings. Wing area is quoted at 393, which, with the quoted gross weight, gives a wing loading 18.2 instead of 19.4 quoted. Likewise, power quoted at 630 gives power loading 11.7 against 11.2 quoted.

No operational height is quoted and a top speed of 234 at sea level gives the phenomenal high-speed figure of 55.8. It is certain that the data are defective somewhere. The speeds are guaranteed to within 3 per cent. so can be accepted. Swan quotes the B.M.W. VIu as maintaining a power of 640 up to 7,220ft. On this power the lower loading becomes 11.53, the wing power 1.58, and the high-speed figure 44.3 for an operational height of 7,200. With all the available data used to its discredit the Heinkel still remains a phenomenal effort.

Pander Postjager.—The operational height is assumed to be sea level in the absence of definite data.

14.—Conclusion

It is hoped that this paper will be of interest to both the tyro and the accomplished technician. The first part is intended to assist in rendering the origin and significance of the figures of merit mentioned clear to those readers of *Flight* who are not overburdened with theoretical knowledge, at the same time emphasising the care which must be exercised in applying the data to general comparisons of different aeroplanes. The latter part is intended to be of more general interest, and in view of the London-Melbourne race it is hoped that Fig. 2 will have a strong topical appeal.

A Link With China

In Singapore considerable importance is attached to the Government director of Imperial Airways (Sir John Salmond) visit to British Malaya. It is understood that he may discuss the possibilities of extending the London-India-Malaya-Australia air service by linking up with China. This was a topic which was considered, too, by Sir Philip Sassoon during his recent tour in Malaya.

Captain Willcock said in a Press interview before leaving

Singapore for China, that he was eminently satisfied with the possibilities for the development of military and commercial aviation in China. It was agreed, he said, both by Sir Philip and by the Officer Commanding R.A.F. in the Far East, that there should be no further delay in linking China with the main England-Australia air route to enable the rapid conveyance of both mails and passengers between Europe and China.

Hong Kong stands out as the focal point, and, although China is not a signatory State to the International Convention, there is little doubt that China would welcome the extension

THE ROYAL AIR FORCE

Service Notes and News



Air Ministry Announcements

No. 230 (FLYING BOAT) SQUADRON

The new flying boat squadron which is one of the new units to be added to the R.A.F. during the current financial year will form next month at Pembroke Dock, and will be known as No. 230 (Flying Boat) Squadron. It will be equipped at first for training purposes with Supermarine "Southamptons."

NEW AIR DEFENCE BRIGADE

The formation of a new Air Defence Brigade is included in the programme of the Army Council.

The 1st Air Defence Brigade, quartered at Blackdown (Alder-shot), is composed of three batteries. Each battery has eight 3in. 20cwt. guns. The new Brigade will be equipped on the same lines.

No. 210 (FLYING BOAT) SQUADRON

An interesting cruise is about to be undertaken by No. 210 (F.B.) Squadron from Pembroke Dock. The squadron will fly the new "Singapore" flying boats out to Singapore base, and then hand them over to No. 205 (F.B.) Squadron there, to whom they have been allotted as new equipment. No. 210 Squadron will then take over the "Southamptons" which No. 205 Squadron now have, and will fly them back to Pembroke Dock. On completion of this cruise, No. 210 Squadron will themselves be re-equipped, surrendering their own "Southamptons" in exchange for Supermarine "Scapas."

R.A.F. FENCING UNION

The fencing competition for novices will be held at the R.A.F. School of Physical Training, Uxbridge, on December 6 and 7, 1934, and will be open to all officers and airmen except: (i) Previous winners for any weapon, excepting bayonet, in the novices' competition. (ii) Previous winners for any weapon at the Royal Tournament. (iii) Bronze medallists and winners of inter-area tournaments (except members of bayonet team combats). (iv) Staff of the R.A.F. School of Physical Training. (v) Fencing "Blues." The competition will be for all weapons—Foil, Epée, Sabre, and Bayonet—but no competitor may enter for more than two weapons.

R.A.F. MEDICAL AND DENTAL SERVICES DINNER

The twelfth annual dinner of the R.A.F. Medical and Dental Services will be held at the Royal Air Force Club at 7.30 p.m. for 8 p.m. on Friday, December 7, 1934. Tickets, 10s. 6d. each, exclusive of wines, may be obtained from the honorary secretary, Sqd. Ldr. R. Boog-Watson, Directorate of Medical Services, Air Ministry, 5-6, Clement's Inn, W.C.2.

No. 203 (FLYING BOAT) SQUADRON REUNION DINNER

A reunion dinner of the officers of No. 203 (Flying Boat) Squadron will be held at the Trocadero Restaurant, London, on Friday, December 14, 1934, at 7.30 p.m. Air Com. W. L. Welsh, D.S.C., A.F.C., will preside. Dinner jackets will be worn. Officers who served in or have been attached to the squadron are eligible to attend, and may invite, as their individual guests, officers of the Navy, Army, or political services who were associated with the work of the squadron in the Persian Gulf. Applications for tickets—12s. each (10s. each for officers' guests), exclusive of wines—stating the names of guests, if any, should be sent as soon as possible, with remittances, to Flt. Lt. G. L. Gandy, R.A.F.O., Air Ministry, Gwydyr House, Whitehall, S.W.1.

"VILDEBEEST" FLOTATION GEAR

Attention is drawn to the fact that the use of the inflatable flotation bag on the "Vildebeest" aircraft involves the obstruction of the passage way between the rear gunner's cockpit on the one hand and the position immediately behind the pilot's cockpit and also the prone bombing position on the other hand. This flotation bag also extends, when inflated, into the forward part of the rear gunner's compartment. When, therefore, the use of this inflatable flotation bag is intended, or is likely to be required, it is the duty of the observer to get aft as quickly as possible and to stand upright in the rear gunner's cockpit in order to avoid any possibility of being trapped by the inflation of the bag.

R.A.F. FLYING ACCIDENT

The Air Ministry regrets to announce that 561061 Leading Aircraftman William Stewart Burns lost his life in an accident which occurred at Abu Sueir, Egypt, on November 20, 1934, to an "Atlas" aircraft of No. 4 Flying Training School, Abu Sueir.

Leading Aircraftman W. S. Burns was the pilot and sole occupant of the aircraft.

SPECIAL NAVAL, MILITARY AND AIR FORCE CHANUCHA SERVICE

A special naval, military and air force Chanukah service will be held at 16.30 hours on December 2, 1934, at the Great Synagogue, Duke Street, Aldgate, E.C.3, and, so far as Air Force exigencies permit, opportunities will be afforded for officers and airmen of the Jewish faith at home stations to attend the service. Officers and airmen who wish to attend should communicate as soon as possible with Rabbi Dayan M. Gollop, B.A., Senior Jewish Chaplain to H.M. Forces, 13, Fawley Road, West Hampstead, N.W.6.



FOR THE NEAR EAST: A batch of Hawker "Hardy" general-purpose machines (525 h.p. Rolls-Royce "Kestrel" 1B) recently completed by the Gloster Aircraft Co., Ltd. These machines will form the new equipment of No. 30 (B) Squadron, stationed at Mosul, Iraq.

R.A.F. BENEVOLENT FUND.

The usual meeting of the Grants Committee of the above Fund was held at Iddesleigh House on Thursday, November 15. Mr. W. S. Field was in the chair, and the other members of the committee present were: Mrs. L. M. K. Pratt Barlow, O.B.E., and Wing Commander H. P. Lale, D.S.O., D.F.C. The committee considered a number of cases and made grants to the amount of £220 5s. 6d.

R.A.F. PERSONNEL AFLOAT

The Air Ministry have agreed, states a new Fleet Order, that R.A.F. personnel posted in future to Fleet Air Arm flights for service in ships other than aircraft carriers shall be allocated by the posting and drafting authorities to individual ships, and shall normally remain in them for the full period of the commission. Airmen's draft notes will therefore indicate their allotted ships in future.

MEDALS FOR N.W. FRONTIER OF INDIA, 1933

His Majesty the King has been graciously pleased to command that the India General Service Medal, 1908, in silver, with clasp "Mohmand, 1933," shall be granted, provided their claims are approved by the Air Council, to personnel of the Royal Air Force who took part in the operations against the Upper Mohmands on the N.W. Frontier of India in 1933. The medal and clasp will be granted to (a) officers and airmen of, or attached to, No. 20 (Army Co-operation) Squadron, during the period July 28, 1933, to October 3, 1933, both dates inclusive; (b) certain personnel of No. 1 (Indian) Group Headquarters, Peshawar, who served in the area west of the road Abazai-Shabkadar Fort-Shabkadar-Pir Kala-Michni, between the Swat and Kabul Rivers, inclusive of the above-mentioned places, during the same period, and (c) authorised public and private followers. Individuals previously awarded the medal will receive the clasp only. Officers no longer serving may obtain a form of application from the Secretary, Air Ministry, Adastral House, Kingsway, London, W.C.2, and airmen no longer serving, from the Officer-in-Charge, Record Office, Royal Air Force, Ruislip, Middlesex. When completed, the form should be forwarded direct to the Secretary, Air Ministry.

ROYAL AIR FORCE GAZETTE

London Gazette, November 20, 1934

General Duties Branch

Lt. Com. S. Richardson, R.N., is granted a temporary commission as Flight Lieutenant with effect from Nov. 12, and with seny. of July 1, 1927.

The follg. Flying Officers are promoted to the rank of Flight Lieutenant:—G. Farnhill (Oct. 13), G. F. Humphries (Nov. 1).

P/O. A. P. Chamberlain is promoted to the rank of Flying Officer with effect from April 7, and with seny. of Oct. 7, 1933.

The follg. Pilot Officers are promoted to the rank of Flying Officer (Nov. 1):—D. P. McKeown, H. D. U. Denison.

Flt. Lt. H. W. Clayton is placed on the retired list (Nov. 17); Flt. Lt. I. G. E. Dale is transferred to the Reserve, class A (Nov. 16); the short service commission of Acting Pilot Officer on probation F. K. N. Cresswell is terminated on cessation of duty (Nov. 15).

Stores Branch

Flt. Lt. H. Sleight is placed on the retired list (Nov. 18).

Accountant Branch

Flt. Lt. J. C. Brice is placed on the retired list (Nov. 18).

Dental Branch

Flt. Lt. R. Scoggins, L.D.S., is granted a permanent commission in this rank (Nov. 21).

PRINCESS MARY'S ROYAL AIR FORCE NURSING SERVICE

Staff Nurse Miss F. B. Ashworth resigns her appointment (Nov. 14).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Squadron Leaders.—H. J. Collins, to School of Naval Co-operation, Lee-on-the-Solent, 26.10.34. For flying duties in "A" Flight. I. Cullen, M.B.E., A.F.C., to R.A.F. Base, Leuchars, 14.11.34. For Armament duties. A. H. Flower, to No. 208 (Army Co-operation) Squadron, Heliopolis, Egypt, 27.10.34. To command vice Sqd. Ldr. J. W. Jones. S. L. Quine, M.C., to No. 216 (B.T.) Squadron, Heliopolis, Egypt, 29.10.34. B. E. Harrison, A.F.C., to R.A.F. Balloon Centre, Rolleston, 9.11.34. To command vice Sqd. Ldr. C. F. Gordon, O.B.E., M.C., D.F.C.

Flight Lieutenants.—G. R. Ashton, to School of Naval Co-operation, Lee-on-the-Solent, 26.10.34. H. F. V. Battle, to No. 11 (B) Squadron, Risalpur, India, 20.10.34. M. B. Mackay, to No. 39 (B) Squadron, Risalpur, India, 20.10.34. J. N. Jaques, to No. 3 Flying Training School, Grantham, 17.11.34.

Flying Officers.—C. E. J. Baines, to No. 24 (Communications)

HOSPITAL ORDERLIES

It has been decided that the title of group V airmen of the medical branch shall be changed from "hospital orderly" to "medical orderly."

MARRIAGE (NAVAL, MILITARY AND AIR FORCE CHAPELS) ACT, 1932

The object of the Marriage (Naval, Military and Air Force Chapels) Act, 1932, is to enable a naval, military or air force chapel, if duly licensed for the purpose by the Bishop, to be used for the marriages of qualified persons and for the publication of their banns of marriage. The chaplain at the Royal Air Force Chapel, Gosport (which is the only R.A.F. chapel at present licensed under the Act) will satisfy himself that the provisions of the law have been complied with before publishing banns or solemnising marriages in that chapel. The Act does not apply to any chapel in Scotland or Northern Ireland or at stations abroad.

ROYAL AIRSHIP WORKS, CARDINGTON

As a considerable amount of kite-balloon flying will take place at the Royal Airship Works, Cardington, the use of the aerodrome except in cases of emergency is to be restricted to pilots detailed to ferry aircraft to and from No. 2 Aircraft Storage Unit. Pilots are warned to avoid circling the area north-east of the airship sheds from which kite balloons are normally flown, and also to avoid flying in the near vicinity of the airship sheds on account of the troublesome eddies caused by these structures. Before an aircraft is flown to No. 2 Aircraft Storage Unit, the pilot concerned is to ascertain from the Superintendent, Royal Airship Works, whether or not the aerodrome is clear of balloons. The balloon cables will be marked with identification streamers, but pilots are warned that they are difficult to see and constitute a grave danger to aircraft. Under conditions of northerly or southerly winds, pilots using the aerodrome should land in the eastern half of the landing area in order to avoid passing over the gas holders which are situated to the north-west of the airship sheds. A wind indicator will be flown from the south-west corner of the eastern shed. Pilots of aircraft not proceeding to or from No. 2 Aircraft Storage Unit but whose course carries them near the Royal Airship Works are to keep at a distance of 4 miles from Cardington.

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers

General Duties Branch

The follg. Pilot Officers on probation are confirmed in rank:—J. M. Evans, B. R. Ker, M. N. Mavrogordato, W. R. Oliver (Sept. 27); A. J. Edmunds, C. R. S. Hayne, C. F. Hughesdon, H. R. Kirkman, W. M. Morris, H. R. Wheeler (Oct. 24); J. Dendy (Nov. 1).

Pilot Officer on probation E. L. Goshing is transferred from class AA (i) to class C (June 14); F/O. C. B. McNair resigns his commission (July 3) (substituted for the notification in the *Gazette* of Oct. 23).

F/O. L. Motley resigns his commission and is permitted to retain his rank (Oct. 7).

SPECIAL RESERVE

General Duties Branch

A. R. Ross is granted a commission as Pilot Officer on probation (Nov. 21).

AUXILIARY AIR FORCE

General Duties Branch

No. 602 (CITY OF GLASGOW) (BOMBER) SQUADRON.—P/O. A. M. Grant is promoted to the rank of Flying Officer (Oct. 22).

No. 603 (CITY OF EDINBURGH) (BOMBER) SQUADRON.—F. W. Rushmer is granted a commission as Pilot Officer (Oct. 19).

Squadron, Hendon, 13.11.34. G. S. Barrett, to School of Naval Co-operation, Lee-on-the-Solent, 26.10.34. A. W. S. Matheson, to School of Naval Co-operation, Lee-on-the-Solent, 26.10.34.

Acting Pilot Officers.—V. H. P. Lynham, to No. 30 (B) Squadron, Mosul, Iraq, 3.11.34. R. G. Slade, to No. 30 (B) Squadron, Mosul, Iraq, 3.11.34. W. N. Stubbs, to No. 84 (B) Squadron, Shaibah, Iraq, 3.11.34.

Stores Branch

Flying Officers.—L. H. Anness, to Aircraft Depot, Iraq, Hinaidi, 3.11.34. J. T. Riggs, to Station Headquarters, Worthy Down, 14.11.34.

Accountant Branch

Pilot Officer.—R. C. S. Allin, to Station Headquarters, Worthy Down, 13.11.34.

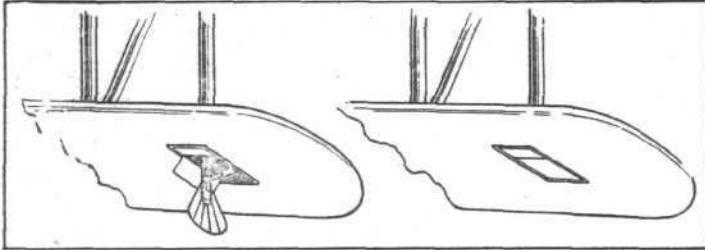
Medical Branch

Flight Lieutenant.—O. M. Fraser, to R.A.F. Depot, Uxbridge, 10.11.34.

THE INDUSTRY

THE FRAZER NASH WING-TIP FLARE

ALTHOUGH most modern aerodromes and many emergency landing grounds are now equipped for night landings, there are obviously certain occasions—such as a forced night landing on an aerodrome not so equipped or on unknown country—where some means of illuminating the ground is desirable. One of the most practical methods of achieving this so far evolved is that by which illumination is obtained by the burning of a magnesium flare attached below the wing tips of the aeroplane, ignited at will by the pilot.



The Frazer Nash Wing-Tip Flare, open and closed.

Naturally, the problem of designing a suitable method of attaching and operating these high-powered flares presents many difficulties, especially that regarding the risk of fire either when the machine is at rest on the ground with the flare still burning, or in the event of a bad landing. In the Frazer Nash Safety Enclosed Wing-Tip Flare Device, which is now being supplied to the British Air Ministry by Smith's Aircraft Instruments, special attention has been paid to these difficulties, and as the result of several years' experimental work a wing-tip flare has been produced which, it is claimed, is as near perfection as possible.

The principal features and advantages of this flare are, briefly, as follows: All working parts are self-contained in a box which is let in flush with the under-wing surface, and therefore does not offer any wind resistance during ordinary flight, or until the flare is actually in use. The fitting of the flare does not involve any structural alteration to the wings, and its size is such that it can easily be accommodated between the ribs of the wing.

It is operated electrically by two buttons in the cockpit, the contacts being so arranged that it is impossible for the flare to be ignited in the box or until the flare has reached the open position. On pressing one button the box opens and the bracket carrying the flare extends, and when fully extended the flare is ignited. The device is provided, if required, with a folding glare shield which, together with the bracket, is mounted inside the box and opens out at the same time as the flare ignites. When operated the flare opens against the slip-stream, and its operation is not affected by side-slipping, climbing, or diving.

The second button operates an electro-magnet gear which enables the pilot to jettison the flare at will should occasion arise—an important feature, as it eliminates risk of fire, always present when landing with a fired flare which has not burnt out. It is impossible for the flare to be jettisoned until the bracket has reached its open position.

The Nash device is designed to take the ordinary "Holt" type flare, R.A.F. pattern, and this is simply inserted by pushing it into a shoe at the lower end of the bracket arm, no wiring up being necessary in fitting the flares once the device has been installed on the machine.

AIR AND ROAD

Mr. Alan Muntz's new car, which he is shown entering in the photograph on p. 1276, is a 1935 S.S. "Airline" supplied by Henlys, Ltd.

CELLON AT PARIS

Most visitors to the Paris Aero Show must have been impressed by the elegant appearance of the Avro 626 and the Avro Autogiro C.30a. Both were given a very fine white finish with Cellon.

MORE "HAWK" DELIVERIES

Baron von Schimkel, of Sweden, has just taken delivery from Phillips and Powis, Ltd., of a "Major Hawk," and has flown it to Sweden. Mr. G. Velen, of Norway, also took delivery of a "Cirrus III-Hawk," and flew it back to Norway with his pilot. Another "Hawk," a three-seater "Major," will shortly be flown to Norway by Mr. Valter and Mr. Thor Bernhoft.

NEW "RAPIER" ENGINES

To the existing range of Napier "Rapier" engines have recently been added three, bearing the series numbers III, V, and VI. Of the older types, the series II is rated at 305 h.p. at 10,000ft., and the series IV, which is also fitted with a supercharger, is rated at 340 h.p. at sea level. The "Rapier" III is moderately supercharged, and develops 335-350 h.p. at 3,000ft. The series V is fully supercharged, and the series VI is moderately supercharged. At present neither has been type-tested. Incidentally, in our notes on the Napier "Dagger" last week the oil consumption was given as 0.51 lb. per h.p. per hour; actually it is but 5 to 10 pints per hour, and the fuel consumption 0.51 pint/h.p./hr.

A NEW HAMILTON AIRSCREW

Originally the Hamilton Standard Controllable-pitch airscrew was limited to two pitch positions—a low-pitch position for taking off and climb, and a high-pitch position for cruising or high speed. In the latest development of this airscrew this limitation has been completely removed, and its design now provides an infinite number of pitch positions, the optimum position being automatically selected for the pilot for each and every flight condition.

The Hamilton Propeller Co. have also announced a new "Controllable" for use with engines in the 200 h.p. class.

Banquet to Scott and Black

On December 19 next the Royal Aero Club, supported by the Royal Aeronautical Society, the Air League of the British Empire, and the Society of British Aircraft Constructors, will give a banquet, followed by a dance, in honour of Mr. C. W. A. Scott and Mr. T. Campbell Black on their return to England after their victory in the England-Australia Air Race. The banquet will be held at 8 p.m. in the ballroom at Grosvenor House, Park Lane, the price of the tickets (exclusive of wines, etc., but including a running buffet until 2 a.m.) being £1 1s. each. Tickets may be obtained from the House Secretary, Royal Aero Club, 119, Piccadilly, London, W.1.

G.A.P.A.N. Lectures in Liverpool

The Guild of Air Pilots and Air Navigators have made arrangements to hold a course of lectures in connection with the Second-class Navigators' Examination in March next in Liverpool. These lectures are being held at the Liverpool Air Port by kind permission of the Liverpool and District Aero Club on Tuesdays and Fridays from 6-7.30 p.m. Signalling practice is held on Wednesdays between 6 and 8 p.m. The classes commenced on November 5. The fee for the entire course is five guineas, which includes the use of maps, charts, and equipment. There are still a few vacancies.

An England-Australia Air Race Dinner

Mr. W. Lindsay Everard, M.P., who was chairman of the Organising Committee of the Royal Aero Club for the MacRobertson International Air Races from England to Australia, entertained at dinner in the Harcourt Rooms, House of Commons, on Wednesday evening, November 14, the officials and officers of the Royal Aero Club who were responsible for organising the event. Lord Londonderry, Secretary of State for Air, joined the company after the dinner, and congratulated the Club and the officials primarily concerned on the organisation of the race. Among those present were Lord Gorell, Sir Francis McClean, Lieut. Col. J. T. C. Moore-Brabazon, M.P., Lieut. Col. F. C. Shelmerdine, Major J. S. Buchanan, Flight Lieut. C. Clarkson, Lieut. Col. M. O. Darby, Major A. Goodfellow, Major R. H. Mayo, Flight Lieut. T. A. Swinbourne, R.A.A.F., Mr. H. B. Howard, Mr. Ivor McClure, Mr. J. Jeffs, Capt. A. G. Lamplugh, Mr. E. C. Bowyer, Mr. C. P. Robertson, Mr. F. Russell, Capt. W. Dancy, Mr. F. Rowarth, Commander H. E. Perrin, Mr. T. F. Bird, Col. and Mrs. Strange, Mrs. H. N. Norman, and Mrs. C. D. Palmer.

NEW COMPANIES

NORTHERN AND SCOTTISH AIRWAYS LTD. Capital £7,000 in £1 shares. Objects: to establish, maintain, work and carry on lines of aerial communication by means of aeroplanes, seaplanes, flying boats, airships and other aerial conveyances, etc. The first directors are: George Nicholson, Midland Bank Chambers, Consett, Co. Durham; Chas. F. Almond, 66, John St., Sunderland; Ada E. Nicholson, Derwent Hill, Ebchester, Co. Durham. Solicitor: Eric W. Moses 66, John Street, Sunderland.

BLACKBURN MOTOR COMPANY (REDCAR), LTD. Capital £600 in £1 shares. Objects: To carry on the business of motor, aeronautical and general engineers, proprietors of aerodromes, garages and service stations, etc. The first directors are:—Thos. H. Blackburn (permanent managing director), 28, High Street, Coatham, Redcar. Jas. W. Dale, 10, Oxford Street, Middlesbrough.

PUBLICATIONS RECEIVED

Scott's Book. *The Life and Mildenhall-Melbourne Flight of C. W. A. Scott.* By Himself. Price 7/6 net. London: Hodder & Stoughton Ltd.